Textile World

MID – JULY • 1959

A McGRAW-HILL PUBLICATION

FACT FILE

ISSUE • 1959

- MANAGEMENT AND SUPERVISION DATA
- MANUFACTURING DATA
- CHEMICAL-TREATMENT AND FINISHING DATA
- MAINTENANCE AND ENGINEERING DATA
- INDEX TO PRODUCTS ADVERTISED

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FACT FILE ISSUE

MID-JULY, 1959 Vol. 109 No. 7M

MANAGEMENT AND SUPERVISION DATA..... 3

MANUFACTURING DATA..... 19

CHEMICAL-TREATMENT AND FINISHING DATA..... 105

MAINTENANCE AND ENGINEERING DATA..... 163

INDEX TO PRODUCTS AND SERVICES ADVERTISED..... 209

INDEX TO ADVERTISERS'..... 223

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MANAGEMENT and SUPERVISION

Energy Measurement—A Key to Management Performance 5
How to Measure and Compare Mill Performance 8
"These Things Get the Job Done for Me" 10
Eight Steps To Sell Workload Changes 11
Rate Yourself on Supervisory Skill 12
Do You Force Employees to Lie? 12

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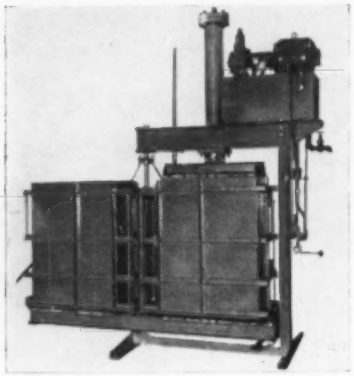

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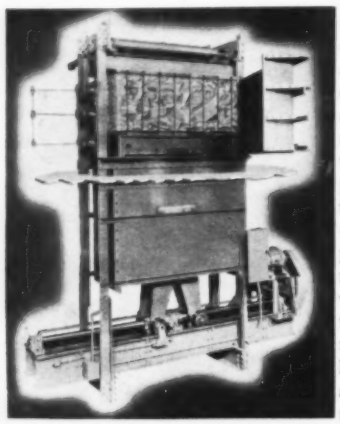
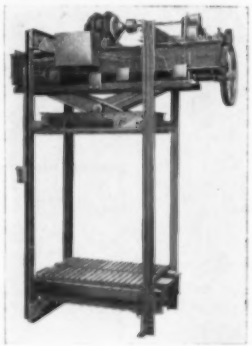


OPEN BALERS



Rigid Construction: Heavy angle-iron side frames and I-beam stress members insure far greater rigidity than the rodtype corner posts. Drive frame has no swinging members, eliminating complicated belt or electrical connections. Designed with liberal factor of safety—much higher pressure ratings would be permissible.

Toggle or Hydraulic: Both types built in wide range of platen dimensions and clearances to suit requirements. Toggle-lever type either belt or motor drive. Hydraulic units complete, including pumps, to give any speed and pressure desired.

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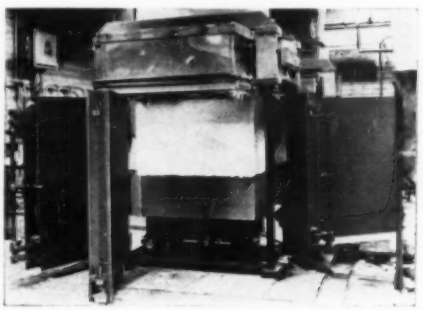
HYDRAULIC BALERS



Outstanding advantages are simplicity, extremely low maintenance cost, freedom from usual operating troubles, and controlled pressure.

Special Features: Skilled help or special training not needed to operate these presses with complete safety. No other type produces equal bale density. Maintenance is far less. Ram, platens and doors only moving parts. Pressures accurately controlled. Doors release and expose three or four sides of bale for convenient wiring and covering.

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Textile plants having special baling-problems are invited to outline their conditions and requirements in detail, so that experienced LOGEMANN baler engineers may make recommendations and offer the proper type of equipment. Inquiries should specify the character of material to be baled, preferred size or weight of bale, and quantity to be baled in a given period of hours.

Energy Measurement—
A Key to Management Performance

From Textile World

The textile industry, like all other manufacturing industries, is engaged in one primary function: converting raw material into salable finished products through the use of energy.

The uses of the two forms of energy, labor and electricity, are so closely related that an analysis of them can be used by management to judge its own performance in certain areas of responsibility.

What a Mill's Record Shows

These analyses are based on the records of a successful, modern mill for the years 1937 through 1955.

Throughout that period, the mill operated 20,000 spinning spindles and 500 looms and employed 550 people. It was completely modernized after 1945.

Like all other textile mills of its age, it went through the business dip of 1938, World War II, the dip of 1949, Korea, and the dip of 1954.

In addition, during those years the presidency passed from father to son and a storm in 1953 did such vast damage to the plant that a major digging-out, rebuilding, and re-equipping had to be done.

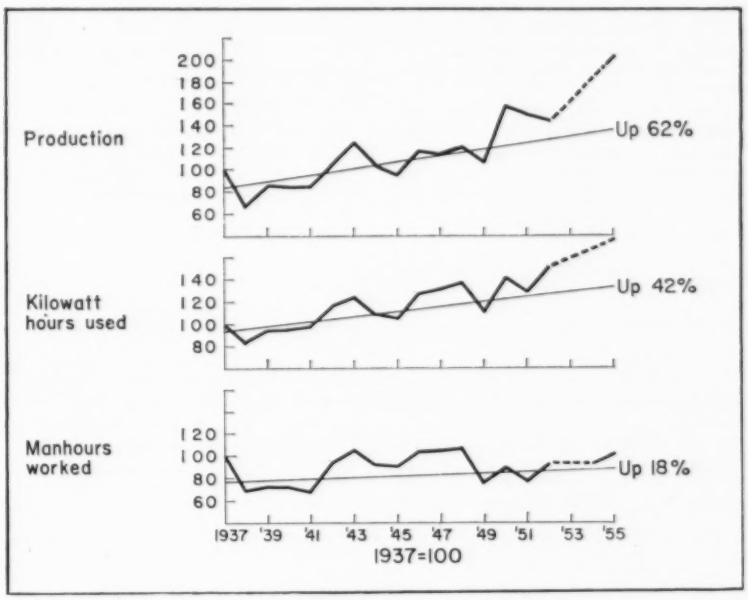
For that reason, performance in 1953 is omitted in the analysis. In some analyses, the rebuilding also affected 1954; and 1954 is omitted in some instances.

The Mill's Record

As shown by the accompanying charts with 1937 = 100, production was up 62%, kilowatt hours used were up 42%, but manhours worked were up only 18%.

These percentage figures are five-year averages. Production being up 62% means that the average annual production for the last five years (omitting unrepresentative 1953 and 1954) was 62% higher than the yearly average for 1937-41.

The straight line through the chart connects the first and last five-year-average points to indicate the trend. The chart line itself connects annual index totals. For example: with 1937 = 100, the average production index for 1937-1941 was 82. For the years 1949, 1950, 1951, 1952, and 1955, it was 135.



The significant things shown by these charts are:

- With the same number of spindles and looms and approximately the same working schedule, the mill increased production quite significantly.
- In doing it, the mill was able to increase its use of cheap electrical energy much faster than it increased its use of more-expensive manual energy.

The Labor Picture

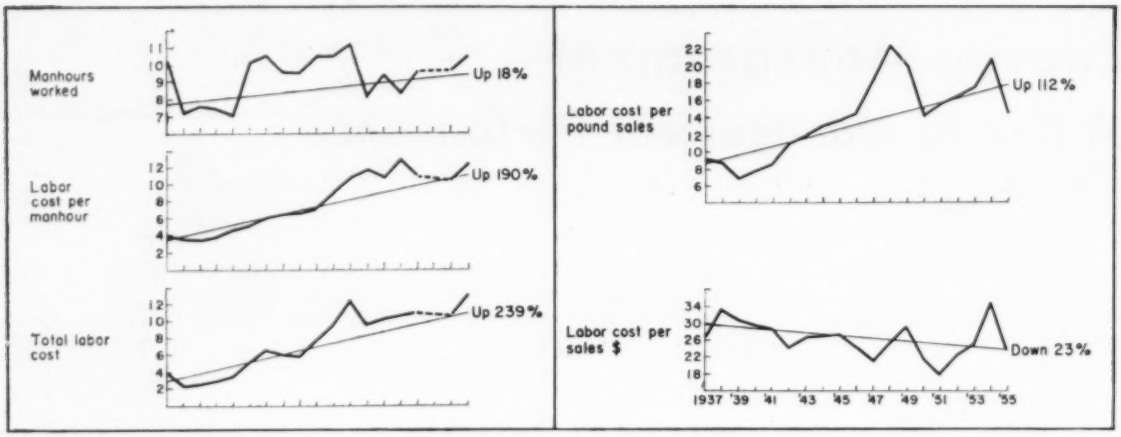
The labor picture shown by this mill's record very likely is representative of most mills.

- Labor cost per manhour (second chart), which simply means collective wages, went up 190% (five-year average).
- This increase, plus an 18% increase in the actual manhours of labor used, raised the mill's total labor cost 239%.
- But because of increased production, the labor cost per pound of goods sold increased only 112%.

Measurement No. 1

Here is the first important measurement of management progress.

Pounds of goods sold increased. It is obvious that something was done in the



mill to increase the amount of goods made and sold without increasing the amount of manual energy in the same proportion.

Unless some improvement had been made in the productivity of labor, the labor cost per pound of goods sold would have increased in direct proportion to the increase in the labor cost per manhour; that is, 190% instead of 112%.

Likewise, the total labor cost would have jumped more than 239%.

Effect of Prices

The last chart, Labor Cost per Sales Dollar, reflects the effect of prices as well as the cost of labor. Therefore it is not as important a measurement of management performance as the other charts, since management has little or no control over market conditions.

However, it would be a dangerous trend for a mill's record to be moving upward instead of downward. That would mean that the mill's labor cost is getting out of hand, prices were dropping to disastrous levels, or a combination of these.

Use of Power

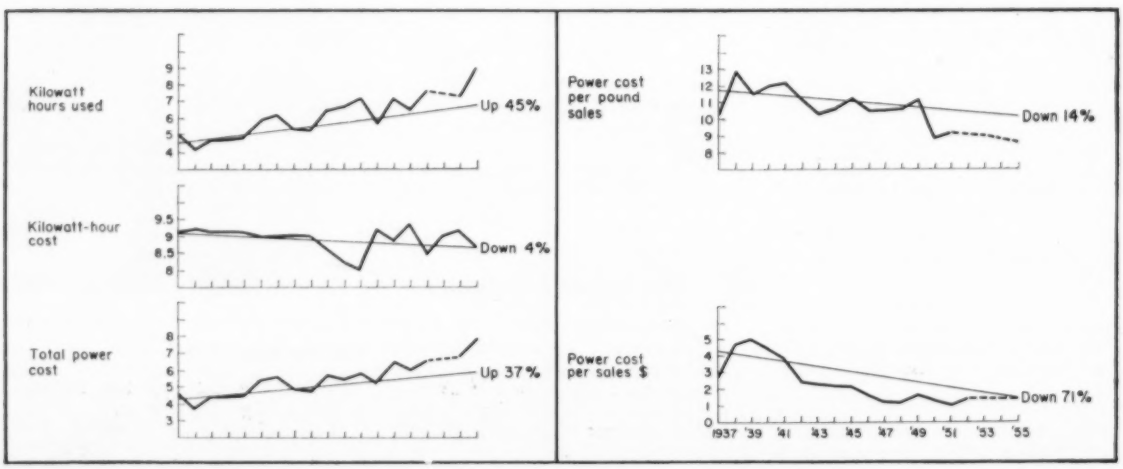
Use of electric power by the mill increased considerably faster than its use of manpower.

- The kilowatt hours used were up 45% on a five-year average, compared to the 18% increase in manhours worked.
- But the cost per kilowatt hour of electricity was slightly lower. Therefore the total power cost was up only 37%, compared to the 239% increase that the mill experienced in its total labor cost during the same period.
- Power cost per pound of goods sold was down 14%.

Measurement No. 2

Here is the second important measurement of the management performance.

As in the case of labor, something obviously was done in the mill to reduce the amount and cost of electric energy



required to produce a pound of goods.

While actual kilowatt hours used increased, pounds of goods produced increased more. The 4% reduction in the cost per kwh. would not net a 14% drop in the cost of power per pound of goods.

The indication of this measurement compared with Measurement No. 1 is that the more electric energy is substituted for manual energy the lower the total cost of energy in a pound of goods.

The test of management performance, then, is how extensively and how effectively it has substituted electric power for manpower.

As in the case of labor, the power cost per dollar of sales is affected by the market price of goods and is not a direct reflection of management performance, although any cost per dollar of sales affects profit.

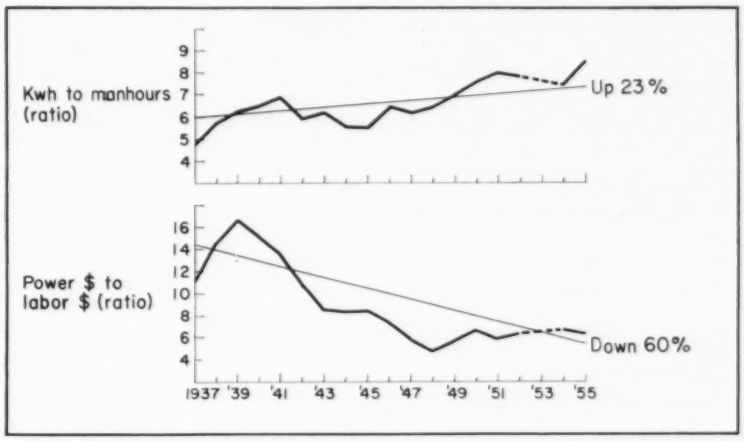
But again, an upward trend instead of a downward trend is a clear warning that management is headed for disaster.

Electric Power vs. Manpower

A clearer picture of how the mill progressed in its substitution of low-cost electric power for expensive manpower is obtained by converting them to a ratio.

The ratio (total kilowatt hours ÷ total manhours) in 1937 was 4.87. That means that in 1937 the mill used 4.87 times as many kilowatt hours as manhours. By 1955 the ratio had risen to 8.64. The five-year-average ratio was up 23%.

• But the cost of manpower rose faster than the mill was able to substitute electric power (second chart). The ratio of power dollars spent to manhour dollars spent was down 60%.



Measurement No. 3

Here is the third important measurement of management performance.

This measurement is the most important of all because it combines in one chart line the two variables electric energy and manual energy. A single chart line therefore shows whether the mill is progressing or losing ground in its energy substitution. It also shows when a trend is reversed.

For example, for 10 years, 1939-48, the mill lost ground (second chart); that is, dollars spent for labor increased faster than dollars spent for kilowatt hours.

But in 1949 the modernization started in 1945-46 began to pay off, and the trend changed from downward to upward for the first time since 1939.

How These Measurements Can Be Used in Mills

Several uses can be made of these management measurements. Three obvious uses are:

1. To Reduce Energy Costs

The interpretation of this mill's record hinged on substituting low-cost electric energy for expensive human energy. No one knows better than mill operators that such substitution must take place or a mill has no chance of surviving in a period of rising human-energy costs.

These measurements can tell management exactly what its trend is and how fast it is making progress or heading for the rocks.

2. To Predict Necessary Moves

Management nearly always has some warning when labor cost is going to increase significantly; for example, when the minimum wage is increased or when a general round of increases is making up.

The result of such an increase always will be a spurt upward in the cost of turning out a pound of goods and in the ratio of labor cost to other costs.

The easiest way to offset such a cost increase is to raise prices. But that can't always be done.

These measurements will tell management how seriously a wage increase will affect the trend of energy costs in the mill and will indicate how much substitution of electric energy for manual energy must be made to offset the added labor cost.

3. To Check One Mill Against Another

An organization that operates more than one mill is always faced with the problem of comparing one operation with another. The problem is always complicated by the fact that the two mills operate under different circumstances and usually on different products.

These measurements will give a precise comparison of any two mills in the fundamental function of improving energy use, regardless of product, location, size, physical layout, etc. Both mills use electric energy and manual energy, and the improvement of each is measured.

How To Measure and Compare Mill Performance

By WENDELL M. PATTON, Jr., in TEXTILE WORLD

Shuford Mills wanted a method for comparing its various mills on certain factors of operation. Management wanted to be able periodically to rank each of the 11 mills in the organization from the best to the worst and to generate a spirit of competition among the superintendents.

After considerable discussion the management group considered five areas of primary importance: raw-material cost, labor cost, quality, waste, and personnel factors. These five areas were later broken down into specifics that could be measured and tabulated.

The quality area was measured by yarn breaking strength and size variation. The waste area was broken down into three factors: invisible waste, reworkable waste, and nonreworkable waste. The personnel area was subdivided into three factors: housekeeping labor turnover, and suggestions.

These breakdowns made a total of 10 factors that were to be used to measure each plant periodically.

Necessary Data

For the periodic raw data necessary for plant comparisons, figures are obtained in the following manner:

Raw materials. This factor represents actual cost per pound of cotton opened for a given period of time. The actual cost was used rather than current or replacement cost because it was believed to make a more meaningful figure. This cost is not directly comparable from plant to plant.

Labor costs. Both direct and indirect labor costs are included in this figure. It is taken directly from our Cost Reports, which were already in existence. The unit is labor cost per pound and is not directly comparable from plant to plant.

Breaking strength. This item represents the break factor of a representative yarn selected for each mill. The yarn number varies from plant to plant, but it is always a stock item for each representative plant. This factor is not directly comparable.

Size variation. An average of percent variations for several yarn numbers in a given plant is used for this factor. It is converted into a coefficient of variation and is not directly comparable from plant to plant.

Invisible waste. This figure represents the actual difference in pounds between the cotton opened each quarter and the fin-

How To Find the T-Score

The formula we use is:

$$T = \frac{10\,(M-X)}{S.D.} + 50$$

where:

T = T-Score
M = mean of distribution
X = the raw measure
S.D. = standard deviation

For example: For a three-year base period for the raw-material cost for Mill A, let's suppose we have a mean cost (M) of 29.063¢ and a standard deviation of 3.82 (S. D.). For the current quarter, we find the raw-material cost to be 28.500 (X); so we substitute in the formula thus:

$$T = \frac{10\,(M-X)}{S.D.} + 50$$

$$= \frac{10\,(29.063 - 28.500)}{3.82} + 50$$

$$= \frac{5.63}{3.82} + 50 = 1.4 + 50$$

$$= 51.4 \text{ T-Score}$$

We know immediately that any T-Score above 50 represents an improvement over the base period. So Mill A has cut its raw-stock cost. This T-Score of 51.4 can be compared directly with the T-Score of any other mill to determine which mill has done the better job. The reason this comparison can be made is that the T-Score represents where a mill stands when measured against its own performance. Comparing two or more T-Scores is merely determining which mill has made the most progress in impreving its own record.

Sample of a Standard Score Card

Actual cost per 100 lbs.	Converted T-Score	Rank	
.2936	58	4	Raw-material cost

Factors and Weightings

Area	Factor		Weighting
Raw materials			6
Labor			5
Quality			
	Break strength	2	
	Size variation	2	4
Waste			
	Invisible	2	
	Reworkable	1	
	Nonreworkable	1	4
Personnel			
	Housekeeping	1	
	Labor turnover	1	
	Suggestions	1	3

ished goods produced, plus visible waste. It is not directly comparable from plant to plant.

Reworkable waste. This unit is also given in pounds and represents only the waste that can be reworked and used again. This factor is not comparable from plant to plant.

Nonreworkable waste. The unit for this factor is in pounds and represents the actual waste considered unusable and sold each quarter. It is not directly comparable from plant to plant.

Housekeeping. Values used for this factor are obtained from periodic housekeeping inspection. These figures are directly comparable from one plant to another.

Labor turnover. This factor represents the actual labor turnover per 100 employees based on the number of employees on the payroll at the end of each quarter. It is directly comparable from one plant to another.

Suggestions. Figures used for this factor represent awards made for suggestions per 100 employees. It is directly comparable from one plant to another.

Because these factors vary from plant to plant, they had to be weighted for relative importance in contributions to plant efficiency. The values, or weights, finally agreed upon are shown in the accompanying table, "Factors and Weightings."

The T-Score Method

Since most of the factors are not directly comparable from one plant to another, some means had to be developed to show the relative position of these plants on various factors. This method of comparison is the very heart of the technique.

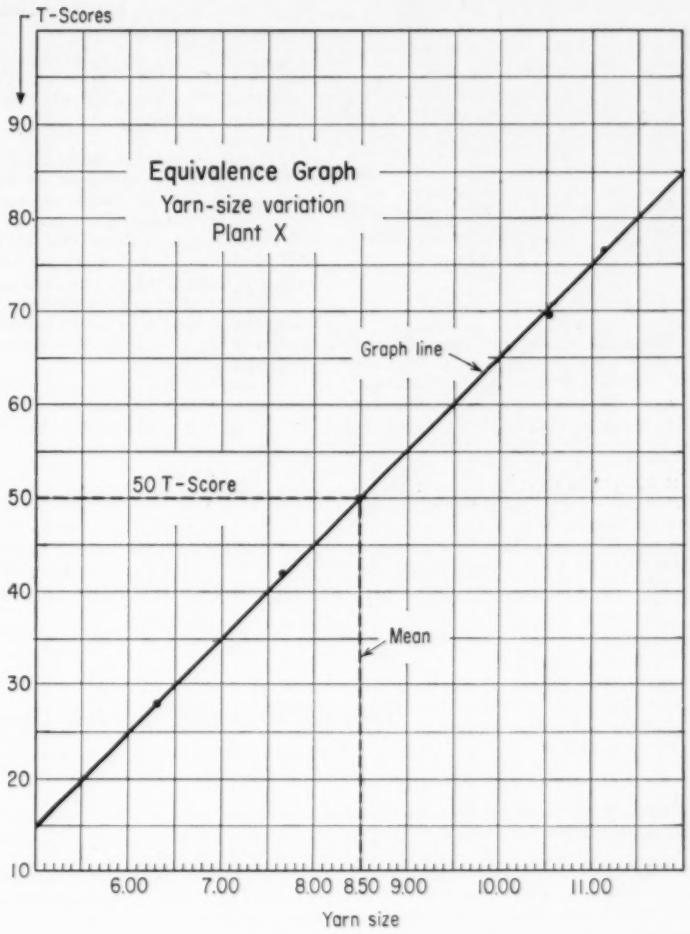
The method selected was a form of the deviation-score principle called the "T-Score." Since raw measures have little or no significance unless they can be compared, it is necessary to derive for each of these raw measures a measure of its relative position in the distribution to which it belongs. The T-Score is such a technique.

The T-Score corresponding to any given raw measure indicates how many standard deviations that the measure deviates from the mean of a distribution.

The use of the T-Score does not involve any assumption concerning the form of the distribution, but it can be more accurately interpreted if the distribution is approximately normal.

When we transform a set of raw measures into their T-Score equivalents, we are in effect arbitrarily substituting a new scale for the original. The new scale will range from 0 to 100, and 50 on the new scale corresponds to the mean on the raw-measure scale. Ten units along the new scale is equal to the standard deviation of the original scale.

(A thorough discussion on the use and



How To Prepare an Equivalance Graph

An equivalence graph will enable you to read T-Scores at a glance without having to compute them.

In the following illustration of how to construct the equivalence graph above, yarn size is used as an example. A graph for T-Scores on any other factor can be constructed in the same way.

1. Select a base period to be your standard of comparison, and go back and obtain figures for this period. (In this example, the figures would be yarn size.) The longer the period the more measures that are obtained, and the greater the statistical accuracy. However, in the mill operation, the longer the period the greater the chance of changes in operation during this period.

2. Compute the mean and standard deviation of this distribution (of yarn size).

3. Plot the raw scores (raw yarn numbers) along the horizontal scale on a sheet of graph paper. Begin your scale somewhat below your lowest figure during your base period, and extend it somewhat beyond your highest figure in order to insure complete coverage.

4. Construct the T-Score scale vertically, ranging from 0 to 100.

5. Select at least two measures from the low end of the distribution and two from the high end. Compute the T-Scores for these measures.

6. Plot these raw measures against their T-Scores on the graph paper. Also plot the mean of the distribution against a T-Score of 50. This plotting will give five points on your graph.

7. Connect these five points with a line, and smooth the line if necessary.

8. To use the graph, take any raw measure, locate it on the horizontal scale, go up to the curve, and read the T-Score on a vertical scale opposite that point.

the limitations of T-Scores can be found in any elementary text on statistics.)

A simple method of computing T-Scores is shown in the accompanying panel, "How To Find the T-Score."

To transform the raw measures in a large distribution into T-Scores, it's much easier to prepare an Equivalence Graph than to apply the formula as shown. The steps in preparing a graph of T-Score equivalents for the raw measures of a distribution are shown in the accompanying panel, "How To Prepare an Equivalence Graph."

Why T-Scores Are Comparable

When all of the raw measures with which we are concerned have been converted into T-Scores, we have essentially changed the measures of all plants to conform to a scale that will begin with 0 and go to 100, with a mean always being 50. These T-Scores are directly comparable. The higher the score, the greater the improvement. Any T-Score above 50 represents an improvement over the base period, and any T-Score below 50 represents a lower score than the average for the base period.

For example, we might find the following situation between Mill A and Mill B in comparing labor costs:

Mill	Labor cost	T-Score
A	7.923	49
B	9.628	61

In this illustration, we have Mill A with a current quarterly labor cost of almost 2¢ less than Mill B. When we convert the actual raw measure of labor cost into T-Scores for each of these mills, we have Mill A with a T-Score of 49 and Mill B with a T-Score of 61. From these scores we can see immediately that Mill B is doing the better job as far as labor costs are concerned, even though its labor cost is greater than Mill A's.

We know by the T-Score of 61 (since 61 is greater than 50, the base score) for Mill B that it is operating at a lower labor cost than it did over the past base period. We also know that Mill A is not doing quite as well as it has done in the past (since 49 is less than 50). By the use of T-Scores, we can compare a mill both with itself and with another mill.

Since one of the end products of our plant-comparison system was to rank our mills and be able to say which mill is performing the best, second best, third best, etc., a method had to be worked out to bring the rankings of the 10 factors together in a single rank. Here is the method we use:

1. For each factor, the number of mills participating was determined.

2. On each factor the mills were ranked from high to low and numbered in that order.

3. Using the weightings for each of the factors shown in the table "Factors and Weightings," we multiplied the weight × the reverse ranking. (Reversing the ranking gives the high values to the best mills and vice versa.) This calculation gives points earned for each mill on each factor.

4. The maximum possible points were determined by multiplying the highest possible ranking in each factor × the weighting and adding these two values.

5. The final score was determined by dividing the actual total score by the maximum total score. This calculation yielded a percentage of maximum as the final score.

6. The mills were then ranked from high to low on the basis of the final scores.

"These Things Get the Job Done for Me"

By ERNEST W. FAIR, in TEXTILE WORLD

Here's what 25 successful supervisors say about getting and keeping employee cooperation:

1. "My job is to get things done through people, and I never let myself forget it. Every step I take is planned toward that goal. The hardest thing I had to learn was that I was not a ringmaster or watchdog over the people in my department. When this clear understanding of my real role as a supervisor came to me, I got better results and my work was made a lot easier."

2. "The most important thing that has helped me get more done in my department is to make sure that every man gets full credit for any job well done. I've found that the surest way to discourage initiative and extra effort in my people is to overlook such things. Even where we have a bonus for such work, I've found the men are just as eager for recognition of what they have done as they are for that bonus."

3. "I try to lead rather than to force my people to do the job. Whenever a difficult job comes up, I've found it cleared away much faster when I stepped in and took the lead instead of pointing it out and telling the men to get the job done themselves. Any given job always gets done in far less time than under the old method."

4. "The biggest thing I've learned is that you have to be constantly on guard against hurting any employee's pride. Sure, you can hire the kind of people who have little pride and are never affected by anything you may do; but they're not the kind of employees who make any supervisor's job easier for him. Pride is a mighty important ingredient in any worth-while worker. Guard it with care and caution."

5. "The most important thing I do to keep my department operating smoothly is that I keep studying each man and woman to make sure what particular incentives affect that individual the most. I doubt there are any two alike. When I've found the one thing that gets top results from any individual, then I know how to handle that employee. It sometimes takes several weeks to discover what it is, but after that there's a lot of smooth sailing."

6. "One thing I've found mighty important is to explain everything. Just telling a man to do something or taking it for granted that he understands all about the problem causes a lot of extra work afterwards and sometimes costly slowdowns."

7. "I set the example I want them to follow. No department in any company is any better than the example set by the supervisor. If he takes a sloppy attitude toward the job, his people can't help but follow suit. If he sets an example of initiative, love of his work, interest in every job, etc., his people will follow suit."

8. "I've found the most important single thing is to be extra careful of what you say and how you say it. When you do that, your words will mean something to the people you're talking to; and you cut down possibilities for misunderstandings and mistakes."

9. "My chief policy is to promote a competitive spirit among the workers in my department. Competition makes for better results, even if it's nothing more than to see who can keep his work the cleanest, make the fewest mistakes, or some other element strictly among the workers themselves. One word of caution: make sure it's not belligerent competition."

10. "To me it's most important that a supervisor learn to be a good listener instead of completely dominating every conversation he has on the job with the people under him. When you're a good listener, you draw your workers out—get them to thinking

more about the work, developing their own ideas, and taking a greater personal interest in the job."

11. "The big thing is keeping a smooth-running operation. I've found one sure way to do it is to bend over backwards to avoid playing favorites. Then every employee works better with the other fellow on the job."

12. "I try to locate troubles before they break out. Just about 25 percent of my time is spent that way. Experience has taught me it's a lot easier to stop something before it comes to the surface than to clean up after it has boiled over."

13. "I always keep a favorable attitude toward the company. What gripes I have against the front office I keep to myself. I've noticed that where supervisors air their dislikes in front of their workers, the efficiency drops right there and soon the whole group is doing the same thing."

14. "Patience is the greatest asset any supervisor can have in handling any man or any problem. Until he learns patience, he can't call himself a good foreman. With it, you never make snap judgments."

15. "The toughest job any supervisor ever faces is in disciplining one of the employees under him. It's a point at which he can start a chain reaction that will lead to an explosion of future trouble for him. I make sure I have all the facts before I ever discipline any employee. That's kept me from making mistakes that could have disrupted my whole department later on."

16. "My pet method of getting the job done is to find every opportunity I can to praise individual employees for their work. It works wonders. But it can be dangerous if it's overdone. You have to earn the proper balance and stick to it."

17. "I'm careful to avoid prejudice against any individual employee. If he or she has feelings, traits, or actions I dislike, I ignore them completely as long as that individual does a good job. I've seen too many cases where supervisors let prejudices against certain employees ruin all the other good things they have done and completely mess up their departments."

18. "To me one of the most important things you can do is never overlook an opportunity to build up a man's job in his own estimation. The man who is proud of his job always does more for you with less trouble."

19. "I keep building on each employee's future with the company. I've found the people under me have to have goals toward which to work hard; without them, they never have the incentive to do anything extra. I never overlook an opportunity to give them something to work for."

20. "A supervisor has to dish out criticism; that's one of the reasons he's in his job. But I've found there are two ways to do it—constructively or destructively. Whenever I criticize an employee, I do it constructively; and I've always had good results with this approach."

21. "Show an interest in and appreciation of an employee's work; that makes him a better man and easier to handle. If you confine your efforts to keeping him working, he'll use every dodge he can think of to keep from doing anything extra."

22. "My pet rule is to always discuss every job problem with the workers involved. Following it has done more for me in my department than anything else I've ever tried to do. You get more willingness to do something extra from your people when they have a chance to help you work things out."

23. "One of my pet methods is to give my employees things to work up on their own. That keeps them from being mere machines. It keeps them alert. It gives them something extra when they have to think out a problem all by themselves during an emergency."

24. "I carefully avoid making promises that I may not be able to fulfill. I've found that unkept promises are a bigger source of resentment by employees against their supervisors than anything else. When it involves the company, I make sure first it will be delivered before I promise my workers anything."

25. "I try to be consistent in my approach to all the problems concerned with my department. I've found the workers are then never afraid of my moods or uncertain about what I will do. It helps them work out a lot of problems on their own, too."

Eight Steps To Sell Workload Changes

By R. G. CARSON, Jr., in TEXTILE WORLD

1. Methods improvements are made before the workload is set. This phase should be a cooperative venture; and the overseer, assistant overseers, and operators should be given a chance to contribute their ideas.

2. When the method has been stabilized, make sure that all operators can perform the job correctly at an acceptable rate of production.

3. Timestudies for rate-setting purposes are made after Step 2 has been completed. The studies should be made openly, with the full knowledge of the supervisors and operators.

4. The workload is carefully calculated; and the results are checked against production records from the early stages of the study, from the payroll department, or from other sources. In case of doubt, make more studies. Keep a complete record of the method used and the studies made.

5. Explain the workload to the departmental supervisors; the plant superintendent may want to be in on this explanation. Cover what the workload means in terms of production per operator, pay per hour, and cost per unit. Foresee as many questions as possible and be prepared with the answers.

6. Explain the workload to the operators in the presence of the overseer or second hand. In some cases, the overseer might explain the workload change, with the timestudy man present to answer detailed technical questions. All operators should be given the opportunity to ask questions. Set a date and time for the rate to go into effect.

7. Be on the job when the rate goes into effect. The timestudy man can give progress reports periodically during the day and at the end of the shift. He should stay with the job until the operators know how to compute their earnings and production and how to pace themselves over the length of the shift.

8. Check up on the job occasionally. Go by at the end of the shift and talk with the operators. Check the payroll records daily and weekly. Such checks can be reduced after the job is running smoothly, but they should never be eliminated entirely.

Rate Yourself on Supervisory Skill

By AUREN URIS, in TEXTILE WORLD

How do you look to your employees?

Your prestige plays an important part in your supervisory success. If your workers are with you, the job's easy. If they're against you. . . .

The fact is, people can and will work wonders for a boss they admire and respect.

This quiz shows how you've been doing and what you can do to win the whole-hearted cooperation of your workers.

	Yes	No
1. Do you make it a point to apply the rules to everyone fairly and impartially?	—	—
2. Do you occasionally make exceptions—in granting privileges, for example—when the circumstances warrant?	—	—
3. Do you make it your business to spend some time, even if it's only a brief chat, with each employee in your department during the week?	—	—
4. When an employee has done a good job—		
a. Do you let him know you know?	—	—
b. Do you let others—fellow employes, his immediate superior, your superior—know of his accomplishment?	—	—
5. When an employee has pulled a boner somewhere down the line, do you—		
a. Show you're less interested in giving him the back of your hand than in finding out why he went wrong?	—	—
b. Take constructive action that will prevent recurrences?	—	—
6. Do you let your employees learn from your mistakes by admitting an error when you've made one?	—	—
7. When an employee takes a stand in an argument or controversy—		
a. Do you back him to the hilt if you think he's right?	—	—
b. Do you try to get him off the hook gently, if he's wrong?	—	—
8. In any group, it's difficult not to like some people better than others; but—		
a. Do you consciously try to avoid having your personal feelings fog up your fairness?	—	—
b. Do you try to get him off the hook gently, if he's impairing the performance of your people?	—	—
9. Do you use encouragement—		
a. To help the person who's failed to get up off the floor for another try?	—	—
b. To get the man who's got a lot on the ball to get in there and really pitch?	—	—

Your Score

Give yourself 10 points for all questions answered Yes. After you've totaled your score, rate yourself according to the following chart:

120 to 140—Super 90 to 120—Good Below 90—Reread the questions answered No to see what you can do to improve.

Do You Force Employees To Lie?

By WILLIAM G. SHEPHERD, in TEXTILE WORLD

How you go about it and what you do about it are the keys to whether you get the truth, evasions, or outright lies when you question workers about things that have happened on the job.

Here are some do's and don'ts that can help you become more effective as a fact-finder and that may encourage employees to volunteer the truth.

1. Develop a tolerance for justifiable failure. This rule doesn't mean you should become lax and blink at every fault but that you should not lose sight of the fact that things can go wrong and that people with the best of intentions can make mistakes.

2. When you're mad, don't proceed until you can feel sure there's no madness in your method. This approach is best in all supervisory situations, but especially when you're asking subordinates to tell you the truth. Few human being can meet anger without feeling either fear or anger in return.

Both emotions have a notorious effect of coloring what we say. For instance, in anger, you, like the rest, are quite liable to overstate your case and make charges that far outweigh the facts of the case.

3. Discourage yes-manism. No one is ever a yes-man unless his superior shows him it's the best policy. As a matter of fact, most people would much rather speak their minds than to yes a superior. But if that's what get's a good reaction from the boss, and you want to get along, why . . .

4. Don't go head-hunting; but if you do, don't expect employees to join you when their colleague or friend is the quarry. They realize that theirs may be the head you hunt next week, and they want protection from their fellow workers; so it is only natural that they exert themselves to avoid putting the finger on someone else.

5. Be slow to judge or at least to announce your judgment. Human beings feel an obligation to avoid known punishment. If you say beforehand that you're going to fire or hang the culprit, you oblige the culprit to seek escape through whatever subterfuge he can concoct. He certainly is not going to step forth and say, "Here I am. Hang me."

6. Give up the philosophy that you must always make the punishment fit the crime. Often punishment is not in order at all; and what is actually called for is greater effort on your part, more training, better inspection, a simple reminder to your people that certain things are important and can't be overlooked.

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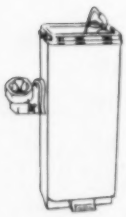
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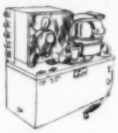
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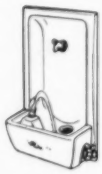
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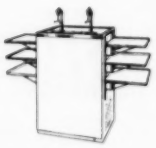
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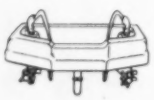
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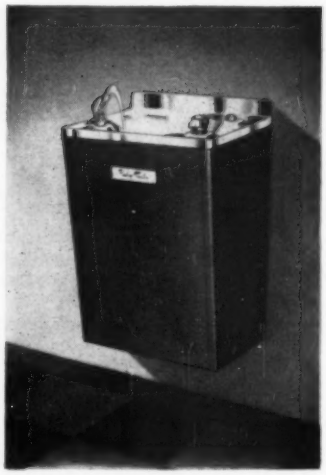

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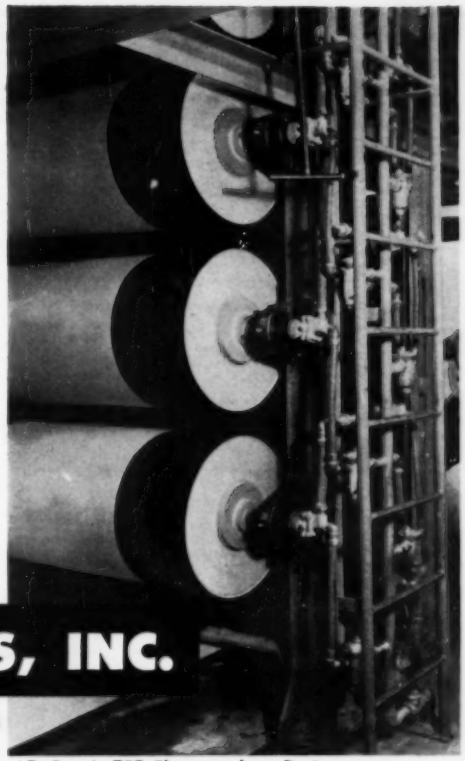

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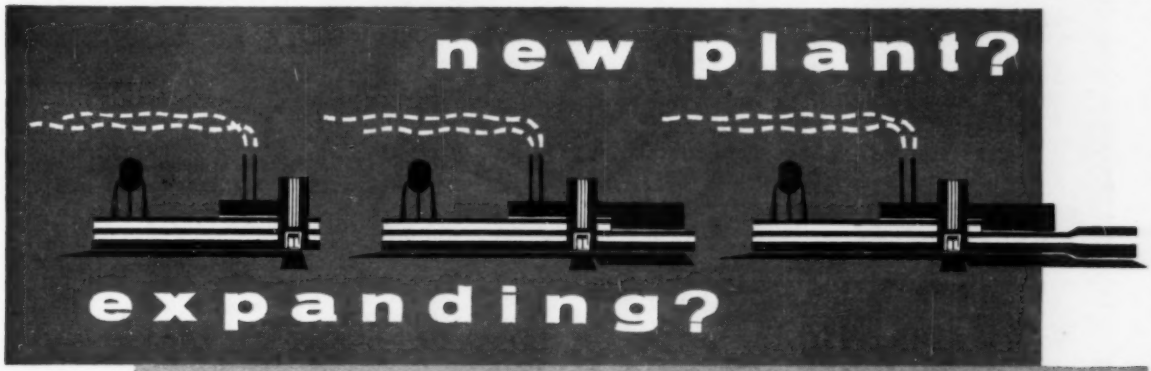

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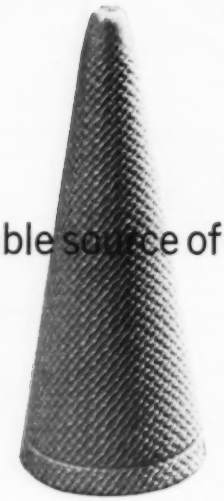

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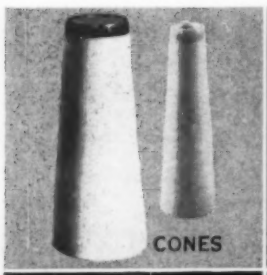

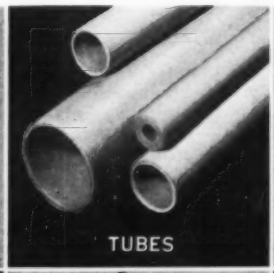

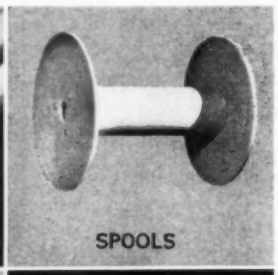

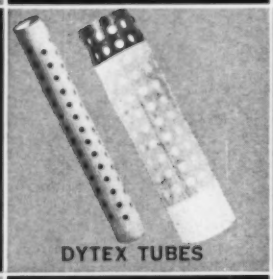

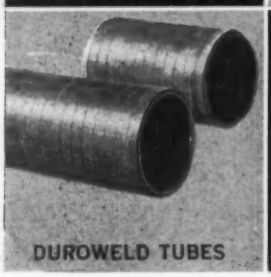

CONES—All types in a variety of sizes, tapers, noses, colors, surfaces, colored tips and bases, printed, treated, perforated; all to customer specification.

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439

MANUFACTURING

Fibers and Yarns 21
Opening and Picking 26
Carding (including Drawing & Combing) 28
Roving 32
Spinning 34
Yarn Handling 39
Slashing 41
Weaving 42
Knitting 48
Tufting 53
Nonwoven Fabrics 54
Cloth Room 55

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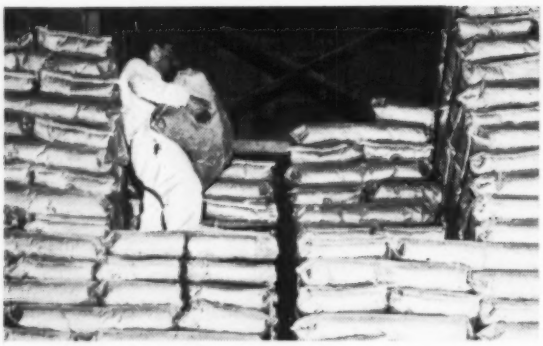

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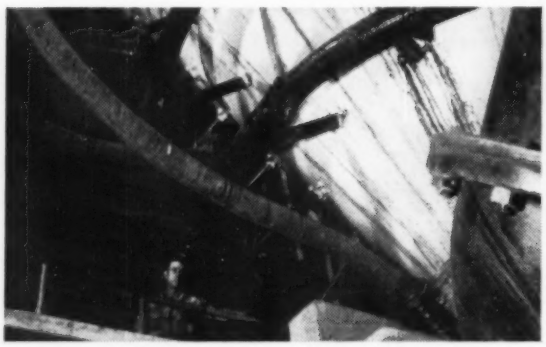

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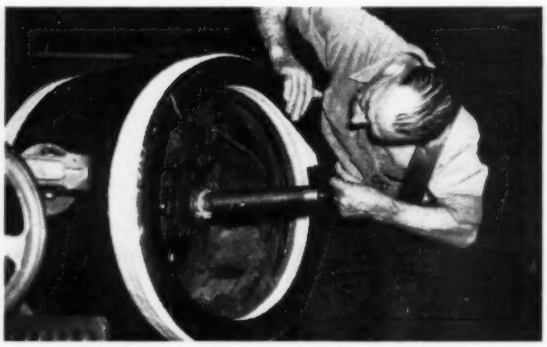

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Yarn Breaking-Strength Charts

The two charts on this page were plotted by F. P. Sheldon & Son from the equations given below each chart. The equations were derived from figures obtained from many tests on a great variety of yarns. The upper chart applies to carded yarns and the lower one to combed yarns. Each chart includes a dotted line for Draper's Standards.

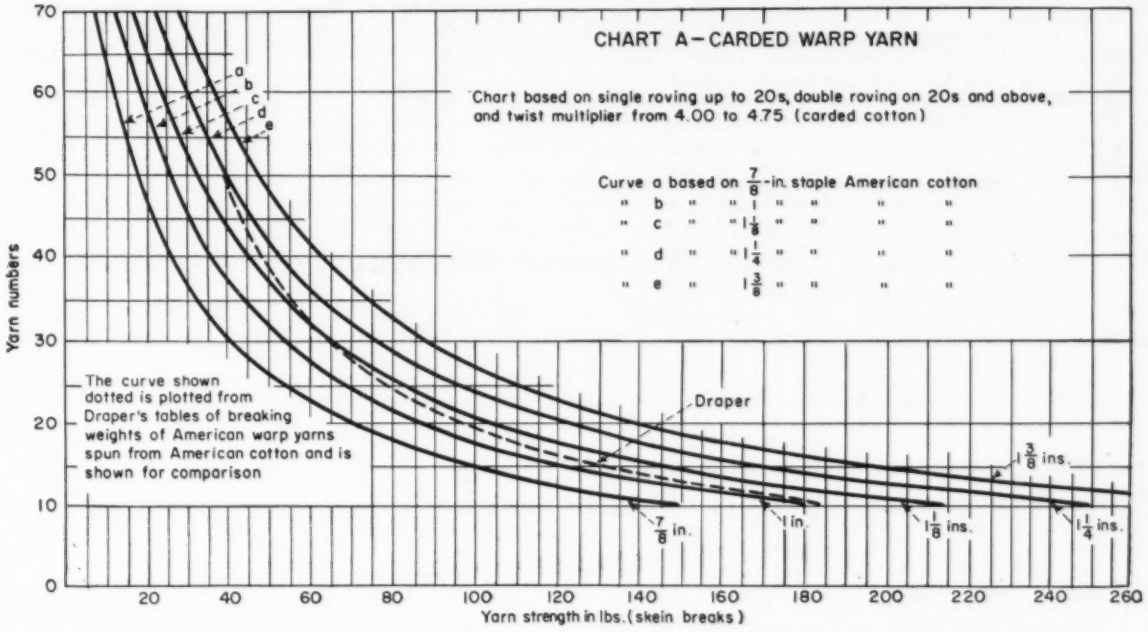


CHART A—CARDED WARP YARN
Chart based on single roving up to 20s, double roving on 20s and above, and twist multiplier from 4.00 to 4.75 (carded cotton)
Curve a based on 7/8-in. staple American cotton
" b " " 1 " " " "
" c " " 1 1/8 " " " "
" d " " 1 1/4 " " " "
" e " 1 3/8 " " " "
The curve shown dotted is plotted from Draper's tables of breaking weights of American warp yarns spun from American cotton and is shown for comparison
Draper
7/8 in.
1 in.
1 1/8 ins.
1 1/4 ins.
1 3/8 ins.
Yarn numbers
Yarn strength in lbs. (skein breaks)

CHART A shows carded warp-yarn strength at 70% r.h., computed from formula 1,600 $(1 \pm 0.11a \pm 0.01\ b) \div N = S$, where N = yarn number, S = strength in pounds, a = difference in sixteenths inch of staple over or under 1 in. (use + sign when over, — sign when under), b = difference of yarn above or below 28s (use — sign when above, + sign when below)

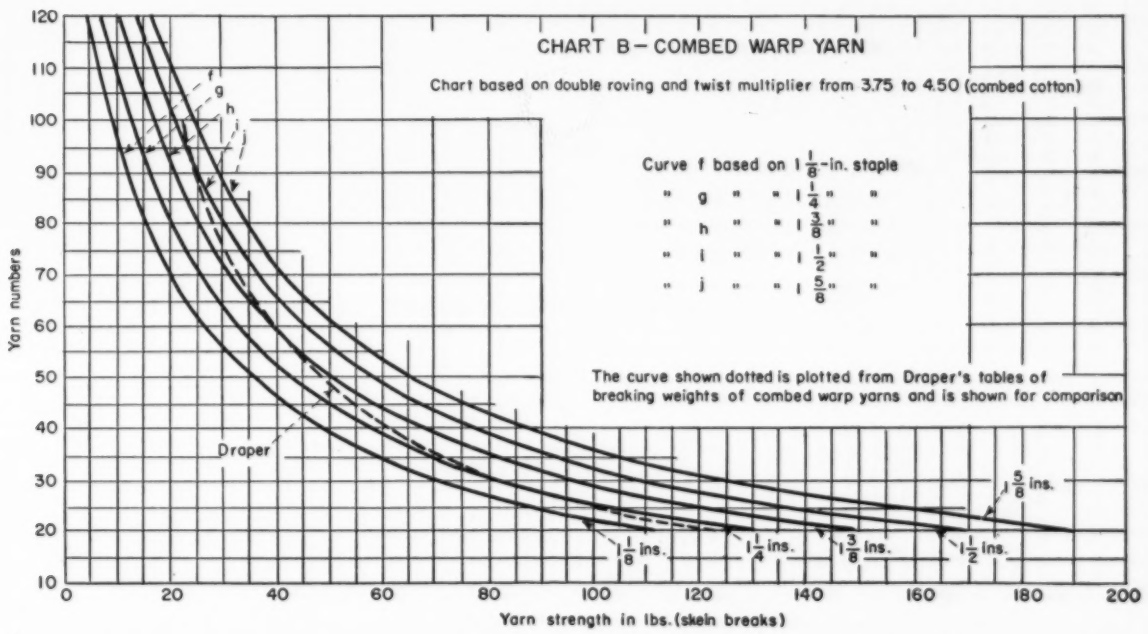


CHART B—COMBED WARP YARN
Chart based on double roving and twist multiplier from 3.75 to 4.50 (combed cotton)
Curve f based on 1 1/8-in. staple
" g " " 1 1/4 " "
" h " " 1 3/8 " "
" i " " 1 1/2 " "
" j " " 1 5/8 " "
The curve shown dotted is plotted from Draper's tables of breaking weights of combed warp yarns and is shown for comparison
Draper
1 1/8 ins.
1 1/4 ins.
1 3/8 ins.
1 1/2 ins.
1 5/8 ins.
Yarn numbers
Yarn strength in lbs. (skein breaks)

CHART B shows strength of combed warp yarn at 70% humidity, computed from formula $(1 + 0.11a \pm 0.01\ b) \div N = S$, where N = yarn number, S = strength in pounds, a = difference in sixteenths inch of staple over 1 in., b = difference in number of yarn above or below 28s (use — sign when above, + sign when below).

Cotton Waste Standards

The percentages of waste given in the table are fairly typical of medium yarn numbers spun from Middling cotton. The percentages are based on the actual weight of stock fed.

The actual total loss per 100 lbs. fed to the openers is 24.6%. The loss obtained by multiplying the total waste percentage loss by 100 gives a total of 26.09 lbs. Waste losses figured on stock fed to each process and added together give a more-precise actual waste loss.

Waste standards (Middling cotton)

Process	Stock fed (lbs.)	Waste (%)	Waste removed (lbs.)	Net weight to next process (lbs.)
Opening and picking	100	3.26	3.26	96.74
Carding	96.74	5.68	5.50	91.24
Drawing and roving	91.24	0.50	0.46	90.78
Combing	90.78	16.00	14.52	76.26
Spinning	76.26	1.25	0.95	75.31
Total		26.69	24.69	

Junction of Any Two Yarn Numbers Gives Size of Two-Ply Yarn

In the use of this table, the yarn numbers may be in any reciprocal system—cotton, worsted, etc.—but not in a direct system, such as denier. Both yarns must be in the same numbering system; for example, if a cotton yarn is plied with a worsted yarn, both yarn numbers must be in the cotton or in the worsted system.

The number found in the body of the table is the equivalent number of the ply yarn. For example, the figure in the table for plying a 10s yarn with a 20s yarn is 6.7, which means that the equivalent number of the ply yarn is 6.7. (If average singles number is used, the ply yarn should be 13.4/2).

Yarn No.	50	48	46	44	42	40	38	36	34	32	30	28	26	24	22	20	18	16	14	12	10	8	6
6	5.4	5.3	5.3	5.3	5.3	5.2	5.2	5.1	5.1	5.0	5.0	4.9	4.9	4.8	4.7	4.6	4.5	4.4	4.2	4.0	3.8	3.4	3.0
8	6.9	6.9	6.8	6.8	6.7	6.7	6.6	6.5	6.5	6.4	6.3	6.2	6.1	6.0	5.9	5.7	5.5	5.3	5.1	4.8	4.4	4.0	
10	8.3	8.3	8.2	8.2	8.0	8.0	7.9	7.8	7.7	7.6	7.5	7.4	7.2	7.1	6.9	6.7	6.4	6.2	5.8	5.5	5.0		
12	9.7	9.6	9.5	9.4	9.3	9.2	9.1	9.0	8.9	8.7	8.6	8.4	8.2	8.0	7.8	7.5	7.2	6.9	6.5	6.0			
14	10.9	10.8	10.7	10.6	10.5	10.4	10.2	10.0	9.9	9.7	9.5	9.3	9.1	8.9	8.6	8.2	7.9	7.5	7.0				
16	12.1	12.0	11.9	11.6	11.6	11.4	11.3	11.0	10.9	10.7	10.4	10.2	9.9	9.6	9.3	8.9	8.5	8.0					
18	13.2	13.1	12.9	12.8	12.6	12.4	12.2	12.0	11.8	11.5	11.3	11.0	10.6	10.3	9.9	9.5	9.0						
20	14.3	14.1	13.9	13.8	13.6	13.3	13.1	12.9	12.6	12.3	12.0	11.7	11.3	10.9	10.5	10.0							
22	15.3	15.1	14.9	14.7	14.4	14.2	13.9	13.7	13.4	13.0	12.7	12.3	11.9	11.5	11.0								
24	16.2	16.0	15.8	15.5	15.3	15.0	14.7	14.4	14.0	13.7	13.3	12.9	12.5	12.0									
26	17.1	16.9	16.6	16.4	16.1	15.8	15.4	15.1	14.7	14.4	13.9	13.5	13.0										
28	18.0	17.7	17.4	17.1	16.9	16.5	16.1	15.8	15.4	14.9	14.5	14.0											
30	18.8	18.5	18.2	17.9	17.5	17.1	16.8	16.4	15.8	15.5	15.0												
32	19.5	19.2	18.9	18.5	18.2	17.8	17.4	16.8	16.5	16.0													
34	20.2	19.9	19.6	19.2	18.8	18.4	17.9	17.5	17.0														
36	20.9	20.6	20.2	19.8	19.4	19.0	18.5	18.0															
38	21.6	21.2	20.8	20.4	20.0	19.5	19.0																
40	22.2	21.8	21.4	21.0	20.5	20.0																	
42	22.8	22.4	22.0	21.5	21.0																		
44	23.4	23.0	22.5	22.0																			
46	24.0	23.5	23.0																				
48	24.5	24.0																					
50	25.0																						

Yarn-Numbering Constants

$$\text{Cotton yarn number} = \frac{1{,}000}{\text{grains for 120 yds.}} = \frac{\text{inches of yarn} \times 0.2315}{\text{weight in grains}} = \frac{\text{inches of yarn} \times 0.015}{\text{weight in grams}}$$

$$\text{Worsted yarn number} = \frac{1{,}000}{\text{grains for 80 yds.}} = \frac{\text{inches of yarn} \times 0.3475}{\text{weight in grains}} = \frac{\text{inches of yarn} \times 0.0225}{\text{weight in grams}}$$

$$\text{Woolen run} = \frac{218.75}{\text{grains for 50 yds.}} = \frac{\text{inches of yarn} \times 0.1215}{\text{weight in grains}} = \frac{\text{inches of yarn} \times 0.0079}{\text{weight in grams}}$$

$$\text{Silk denier} = \text{grains for 638 yds.} = \frac{\text{weight in grains} \times 22{,}968}{\text{inches of yarn}} = \frac{\text{weight in grams} \times 354{,}000}{\text{inches of yarn}}$$

$$\text{Denier} = \frac{\text{weight in grams} \times 9{,}000}{\text{length in meters}}$$

Denier of 1 meter length = weight in milligrams × 9

15 Checks To Inspect Purchased Yarn

By P. WIERKS, in TEXTILE WORLD

1. A well-wound cone shows a symmetrical pattern of yarn layers that are undisturbed from top to bottom. The sides of this cone give the impression of a straight diagonal line without hills. The yarn below a fault formed by such a hill would, during overhead unwinding, be subject to high tension and friction.

2. The yarn at the top and bottom of the cone should lie in true circles. Ends protruding over the top or bottom surface and crossing other circles are likely to break when unwound at high speeds. The top of the paper tube should be visible. An overrun cone will not unwind smoothly at the end.

3. Handling, packing, and transport are not always done with the necessary care cones require. Yarn rubbing and small cuts where the cones have hit a sharp edge are readily noticeable at the top and bottom edges.

4. The cone should be firmly wound. Too-soft cones hold less yarn and affect the efficiency of the next process. In severe cases the yarn will unwind in bunches.

5. Cone weight can be important in special cases such as when an order for a creel calls for 50 ends to be covered by 50 lbs. of yarn. This lot must be ordered on 1-lb. cones to avoid splitting the cones.

6. Inspect actual weight of the yarn against the invoice weight to guard against human errors. Bookkeeping and shipping are done by different people, and a hastily written 7 can often pass for a 9.

7. The scale weight is affected by moisture content and could be wrong due to the testing procedure at the shipping point. The difference between scale weight and actual yarn content can be a high figure for a large shipment.

8. The yarn number must be checked carefully. Too-coarse yarns provide a loss for the mill because the fabric will be too heavy, while too-fine yarns open the door for customers' complaints.

ASTM standards allow a tolerance of one yarn number either way from standard for medium-size worsted yarns. ASTM standards for cotton yarns permit a variation of ±3%, and 5% for spun-rayon yarns.

9. The raw material in the yarn is the cause of one of the main price variations for yarns of the same number. The ideal way to inspect this item is a thorough analysis, but many mills prefer to investigate this point only when the raw material is believed to be substandard.

10. Correctly twisted yarn should have (1) the correct direction of twist, (2) the specified amount of turns per inch, and (3) an even distribution of twist. The turns per inch, measured over several 10-in lengths, should conform to the number stated on the yarn order and be evenly distributed over longer distances.

Here again, ASTM standards permit a variation. Woolen and worsted yarns are acceptable when the twist does not vary more than 7.5% from package to package as well as from the specified twist. Cotton yarns should stay within a 10% limit for single or 5% for plied yarns. A 5% variation is allowed for spun-rayon and acetate yarns.

11. High-priced yarns should be outstanding for evenness and appearance, while an attractive price will offset a certain lack of those features in lower grades. The yarn should be reasonably free from visual faults such as thick ends, slubs, neps, foreign waste, dirty or oily spots; and it should appear even to the eye.

12. Sufficient strength to withstand subsequent processes is a necessity for all yarns. A quick, manual examination will show if the yarn has at least the required minimum strength. Take about 4 ins. of yarn between the thumb and forefinger of each hand and apply a slow, steady pull by moving the hands outward. A clear cut at both breaking points without any of the components protruding is a promising sign for the absence of such faults as cracked ends.

13. The shade of dyed yarn must match the original sample. Although the variations between the original sample and the first shipment may not be significant, the variation between the original sample and the second shipment could be too much.

14. The unwinding qualities of the cones can be accurately rated while you are checking the over-all yarn length for evenness, waste, strength, and twist. A cone can appear to be ideal on the surface but the yarn may bunch, block the tension devices, and increase waste.

15. Check the knots. If a too-short tail end is left, slippage might occur and cause a yarn break. Long tails cause headaches for weavers and burlers.

Percent of Nylon in a Blend

Occasionally it is desirable to check the percent of nylon present in a blend containing cotton, wool, or rayon. The principal reagent used is formic acid (90%). Extreme caution must be used in handling this acid.

The determination can be made on either fiber or fabric. Fiber should be fluffed out and loosely put into the weighing dish. Fabric should be prepared in small ½- to 1-in. squares.

Procedure

1. Remove in an oven all traces of moisture from a clean weighing dish and its lid, and then weigh them on an analytical balance.
2. Place approximately five grams of the blend in the dish; and put the dish again in the oven, at 210 to 220° F., with the lid removed.
3. Allow the sample to dry at this temperature for 3 hrs.
4. Remove the dish with the lid in position, and place it in the dessicator to cool.
5. Remove and weigh the dish to get the net dry weight of the sample.
6. Place the weighed sample in a 250-ml. Erlenmeyer flask, and add 100 ml. of formic acid (90%).
7. Insert a stopper in the flask and shake gently for 2 hrs. Let the fibers settle.
8. Remove the stopper and decant the clear liquid in the flask into a glass beaker. Make certain that no fibers are poured into the beaker.
9. Add another 100 ml. of formic acid (90%), replace the stopper, and shake gently for 1 hr.
10. Filter the solution through a previously prepared Buechner funnel, set up for use on a 500-ml. vacuum filter flask with a vacuum line attached.
11. Make sure no nylon is left in the 250-ml. flask. Check the final formic-acid washing of the flask by adding a drop of it to 25 ml. of water. If the water becomes cloudy, additional washings are needed.
12. Replace the 500 ml. filter flask with a new one, and wash the residue in the Buechner funnel with distilled water.
13. Remove the funnel, and place the residue in a 212 to 220° F. oven for 3 to 4 hrs. Then place the residue in a dessicator, cool, and weigh on an analytical balance.

$$\frac{\text{weight of material before extraction} - \text{weight of material after extraction}}{\text{weight of material before extraction}} \times 100 = \% \text{ wool in the blend}$$

$$100 - \% \text{ wool} = \% \text{ nylon in blend}$$

Cotton-Yarn Strength

Tables to estimate the skein break strength of carded yarns have been worked out by J. F. Bogdan, director of processing research, School of Textiles, N. C. State College, Raleigh, N. C. A range of carded yarns from 6s to 50s with twist multipliers from 2.5 to 5.5 are given in the tables.

4.0 TM Skein break (lbs.)

Yarn No.	Q												
	18	19	20	21	22	23	24	25	26	27	28	29	30
6	267	306	343	376	410	442	474	502	530	558	584	609	634
7	225	258	290	319	349	376	402	428	452	476	497	519	540
8	192	221	249	276	302	326	350	372	393	414	433	452	471
9	167	193	218	243	265	288	308	328	347	366	383	400	417
10	147	171	194	216	236	257	275	294	311	328	344	359	374
11	131	153	173	194	213	231	249	265	282	296	311	325	339
12	117	136	156	176	193	210	226	242	256	270	284	297	309
13	106	124	143	160	177	192	207	222	235	248	260	272	284
14	96	112	130	147	162	177	191	204	217	229	241	252	263
15	87	104	120	136	150	164	177	189	201	213	223	234	244
16	80	95	111	126	139	152	164	176	188	198	209	218	228
17	73	88	103	117	130	142	154	165	175	186	196	205	214
18	67	81	95	109	121	133	144	155	165	174	184	192	201
19	62	75	89	102	114	125	135	146	155	164	173	181	190
20	57	70	83	95	106	117	127	137	146	155	164	172	179
21	53	65	77	89	100	111	120	130	138	147	155	163	170
22	49	61	73	84	95	105	114	123	131	140	147	154	162
23	46	57	68	79	90	99	108	117	125	133	140	147	154
24	42	54	65	75	85	94	103	111	119	126	134	141	147
25	39	50	61	71	81	89	98	106	113	120	128	134	141
26	37	47	57	68	77	85	93	101	108	115	122	128	134
27	34	44	54	64	73	81	89	96	103	110	117	123	129
28	32	41	51	61	69	78	85	92	99	106	112	118	124
29	29	39	49	58	66	74	82	89	95	101	108	114	119
30	27	37	46	55	63	71	78	85	92	98	103	109	115

4.5 TM Skein break (lbs.)

Yarn No.	Q												
	18	19	20	21	22	23	24	25	26	27	28	29	30
6	301	332	362	390	417	444	468	493	517	540	563	586	608
7	253	280	306	331	354	377	400	420	441	461	480	500	519
8	218	242	265	286	307	327	347	365	384	401	418	436	452
9	190	212	232	252	270	289	306	323	339	355	370	385	400
10	168	188	207	224	241	258	273	289	303	318	332	345	359
11	150	168	186	202	217	232	247	261	274	287	300	313	325
12	135	152	168	183	197	211	225	238	250	262	274	285	297
13	122	138	153	167	180	193	206	218	229	241	251	262	273
14	111	126	140	153	166	178	190	201	212	222	232	242	252
15	102	115	129	142	153	165	176	186	196	206	216	225	232
16	93	107	119	131	143	153	163	174	183	192	201	210	219
17	86	99	111	122	133	143	153	162	171	180	189	197	205
18	79	92	103	114	124	134	143	152	161	169	177	185	193
19	74	85	96	107	116	126	135	143	151	159	167	175	182
20	68	80	90	100	110	118	127	135	143	151	158	165	172
21	64	74	84	94	103	112	120	128	135	142	149	156	163
22	59	70	80	89	97	106	114	121	128	135	142	149	155
23	55	65	75	84	92	100	108	115	122	128	135	142	147
24	52	61	71	80	88	95	103	110	116	123	129	135	141
25	48	58	67	75	83	91	97	104	111	117	123	129	135
26	45	55	63	72	79	86	93	100	106	112	118	124	129
27	42	52	60	68	75	82	89	95	101	107	113	118	124
28	40	48	57	65	72	79	85	91	97	103	108	114	119
29	37	46	54	61	69	75	82	87	93	99	104	109	114
30	35	43	51	59	66	72	78	84	89	95	100	105	110

Because combed yarns can be assumed to be 10% stronger than carded yarns, combed-yarn strengths can also be calculated from the tables. These facts are required: (1) yarn number, (2) twist multiplier, and (3) skein break of one yarn spun from that stock.

Here's how the tables are used. If you know that the skein break of a 20s carded cotton yarn with a 4.0 TM is 117 lbs., you can find its Q or quality-reference number by finding the column in which 117 occurs opposite 20s.

The Q value in the 4.0 TM table is 23. The approximate strength of any yarn number or twist multiplier in the range of tables can be predicted. If you want to know the skein break to be expected if you spin this stock into 30s yarn with a 4.5 TM, turn to the 4.5 TM table and find opposite 30s yarn the figure under the Q = 23 line. The skein break is 72 lbs.

Yarn Number and Tenacity Expectancies for Nylon-Wool Blends

Woolen Yarns

Nylon staple (%)	Expected tenacity (grams per denier)	Single-end breaking strength (grams)	Expected yarn No. (run)
0	0.36	200	5.0
10	0.45	200	6.25
15	0.495	200	6.90
20	0.54	200	7.54
25	0.585	200	8.15
30	0.63	200	8.8
35	0.675	200	9.42

Worsted Yarns

Nylon staple (%)	Expected tenacity (grams per denier)	Single-end breaking strength (grams)	Expected yarn No. (worsted)
0	0.8	160	40s
10	1.09	160	54s
15	1.22	160	61s
20	1.36	160	68s
25	1.5	160	75s
30	1.64	160	82s
35	1.78	160	89s

What Is Denier?

By CAROLINE BOYER, in TEXTILE WORLD

To mill men the term "denier" is a familiar word, but to many it has little meaning. By definition, denier is the weight in grams of 9,000 meters of yarn.

1. Denier is a unit of measurement that reflects weight per unit length.
2. Denier denotes weight in grams for 9,000 meters of length.
3. Denier denotes the coarseness or fineness of a yarn.
4. Denier relates to the size or the diameter of the yarn.
5. The lower the denier, the finer the yarn.

The term denier came into use centuries ago, when merchants used a legal coin called a denier as a weight to determine the size of the silk yarn bought or sold.

The basic unit of the denier system is: No. 1 denier equals 4,464,528 yds. per lb.

By contrast:

No. 1 singles equals 840 yds. per lb. (cotton system)
No. 1 run equals 1,600 yds. per lb. (woolen system)
No. 1 singles equals 560 yds. per lb. (worsted system)

This comparison illustrates that one denier is extremely fine—so fine that no continuous-filament yarn is made that fine. Generally, finer yarns such as 60s or 80s (cotton system) are spun from 1.0-den. rayon staple.

Today, man-made fibers are produced in the forms of filament yarn, staple, tow, or all three forms. Irrespective of the form,

the size is referred to as denier. For example:

- No. 1 denier staple is an extremely fine individual fiber.
- 1,100 denier is a continuous-filament yarn that is rather coarse and is used for tire-cord fabric.
- 190,000 total denier is a thick strand of untwisted continuous filaments that is easily converted to top.

The yarns per pound would be:

1.0 den. equals 4,464,528 yds.
1,100 den. equals 4,059 yds.
190,000 den. equals 235 yds.

Yarns such as 1,100, 1,650, and 2,200 den. are very coarse and are used principally for tire-cord fabrics. Yarns such as 30 or 50 den. are very fine and are usually woven or knitted into sheer fabrics.

If denier is the weight in grams of 9,000 meters of yarn, a yarn of this length weighing 100 gms. is a 100-den. yarn. A yarn of this same length but weighing 1,100 gms. is a 1,100-den. yarn, much coarser than a 100-den. yarn.

The number of filaments in a yarn does not determine or influence the denier of the yarn. Yarns of the same denier may be spun with different numbers of filaments, that is, a 100-den. yarn may contain 40 filaments (100/40) or 60 filaments. (100/60) or 100 filaments (100/100). Each rayon producer decides how many filaments a certain yarn is to contain.

Denier per filament (that is of each filament contained in a yarn) is easily determined by dividing the denier of the yarn by the number of filaments, as:

100/40 equals 2.5 den. per filament
100/60 equals 1.6 den. per filament
100/100 equals 1.0 den. per filament.

Calculations for Denier Size

Two systems of measurement, the English and the metric, are widely used in determining the denier size of a yarn. The following calculations are useful in converting skein weight to yarn denier.

English System

I. The denier size of a skein 300 yds. in length = [wt. of skein in grains × 1.64] ÷ 0.7716.

If a gram scale is used instead of a grain scale, substitute 0.05 for 0.7716.

II. The denier size of a 120-yd. skein = wt. of skein in grains ÷ 0.18815.

III. The denier size of any length of yarn = [wt. of skein in grains × 4,464,-528] ÷ [skein length × 7,000].

In this calculation, 4,464,528 is the number of yards of 1.0-den. yarn in 1 lb. and 7,000 is the number of grains in 1 lb.

Metric System

I. The denier size of a 450-meter skein = wt. of skein in grams × 20.

If a 225-meter skein is used, multiply by 40 instead of 20.

If a 90-meter skein is used, multiply by 100 instead of 20.

II. The denier size of any length of yarn = [wt. of skein in grams × 9,000] ÷ skein length in meters.

In this calculation, 9,000 is the number of deniers (approximately) in 1 lb. of yarn.

From "Rayon Yarn Calculations," International Textbook Co.

Tex—A New Yarn-Numbering System

By B. L. WHITTIER, in TEXTILE WORLD

Table 1—Eight Ways To Number the Same-Size Yarn

Yarn-numbering system	Method	Yarn number
Jute (Spyndle)	Direct	0.72
Woolen (run)	Indirect	12.5
Woolen (typp)	Indirect	20
Cotton (hank)	Indirect	23.8
Worsted (hank)	Indirect	35.7
Woolen (cut) and linen (lea)	Indirect	66.66
Asbestos (cut) and glass (cut)	Indirect	200
Silk and synthetics (denier)	Direct	223.23

YARN weighing 1 lb. per 20,000 yds. can be numbered in eight different ways.

Table 2—Comparison of Tex With Equivalent Numbers

Tex number	Cotton number (approximate)	Worsted number (approximate)	Denier
5	120	..	45
10	60	..	90
15	40	60	135
20	30	45	180
25	24	36	225
30	20	30	270
35	17	25.5	315
40	15	22.5	360

TEX NUMBERS range upwards from fine to coarse, similar to the denier system.

Table 3—Conversion of Tex to Cotton Numbers

Tex number	Yards per pound	Cotton number
10	49,605 ÷ 840 =	59
20	24,802 ÷ 840 =	29.5
30	16,535 ÷ 840 =	19.7
40	12,401 ÷ 840 =	14.75

CONVERSION of Tex to cotton numbers is made by dividing yards per pound by 840 (yards per hank).

TEX, A YARN-NUMBERING SYSTEM based on the weight in grams of a kilometer of yarn, eventually may replace the eight or more systems now in use.

Advantages of such a universal system are easy to see. A yarn that runs 20,000 yds. to 1 lb., for example, can have eight different numbers, as shown in Table 1.

When the textile industry was divided clearly into distinct segments, such as silk, cotton, and wool, each branch was not concerned to any great extent about the numbering system used by another branch. But the distinction between different branches of the industry has been diminishing as the use of man-made fibers and blends of all fibers and yarns has increased.

A mill producing sales yarn may supply cotton mills, woolen or worsted mills, or mills weaving silk and synthetics fabrics. A cotton or woolen mill may produce yarns designated by one system in its spinning room and weave them into a fabric containing filament or spun yarns with numbers based on a different system.

These complications are well known, and the situation will

become more complex as the trend toward blends increases.

The Tex unit is the weight in grams of one kilometer of fiber, filament, or yarn. Linear density, expressed in terms of weight per length, is similar to the denier unit and the Grex unit. A major difference is the use of 1,000 m. instead of 9,000 or 10,000 m. which results in reduction of the number that expresses the linear density of a yarn.

This figure means a closer relationship between cotton and worsted yarn numbers in the medium range of textile yarns. In Table 2, the comparison of Tex numbers with equivalent numbers illustrates this relationship within a wide range of spun yarns.

Many ideas have been suggested for a universal yarn-numbering system. Consensus is that a direct system is desirable because the number increases as the linear density increases. If two strands are twisted together, the number of the resultant yarn is equal to the sum of the number of each strand even if the strand is of different linear density. For example, two-ply yarn made of 10 Tex and 20 Tex combined equals 30 Tex.

Testing Wool Blends

Use this formula to find the coefficient of variation of blends of wool and other fibers.

$$CV_1 = \sqrt{CV_R^2 + \left(\frac{C_1 - C_2}{C_1 + C_2}\, CV_B\right)^2}$$

Where: CV_R = true coefficient of variation per cent of the mass per unit length
CV_B = coefficient of variation per cent of the irregularity in blending
CV_1 = coefficient of variation per cent registered by the tester.
C_1 and C_2 = reading constants according to the table.

Material	Constant (C)
Wool	1
Cotton	0.91
Viscose	0.89
Nylon	0.90

Consider a 50-50 wool-nylon blend. Assume that the blending of the wool and nylon varies along the length of the yarn and $CV_B = 50\%$ and $CV_R = 20\%$.

$$CV_1 = \sqrt{20^2 + \left(\frac{1 - 0.9}{1 + 0.9}\, 0.5\right)^2}$$
$$= \sqrt{400 + 6.75}$$
$$= 20.3\%$$

OPENING & PICKING

Percentage of Oil on Blends

The table below can be used to find the percentage, by weight, of oil to be applied to the blend, the amount of emulsion needed for a weight of the blend, and the proper ratio of water to oil in the emulsion.

Amount of emulsion used on blend		Ratio of water to oil in emulsion						
Gallons per 1,000 lbs. of blend	Quarts per 100 lbs. of blend	2 to 1	3 to 1	4 to 1	5 to 1	6 to 1	8 to 1	10 to 1
		Percentage						
50	20	12.9	9.7	7.8	6.5	5.5	4.3	3.5
45	18	11.6	8.7	7.0	5.8	5.0	3.9	3.2
40	16	10.4	7.8	6.2	5.2	4.4	3.4	2.8
35	14	9.0	6.8	5.4	4.5	3.9	3.0	2.5
30	12	7.8	5.8	4.7	3.9	3.3	2.6	2.1
25	10	6.5	4.8	3.9	3.2	2.8	2.2	1.8
20	8	5.2	3.9	3.1	2.6	2.2	1.7	1.4

Courtesy International Correspondence Schools

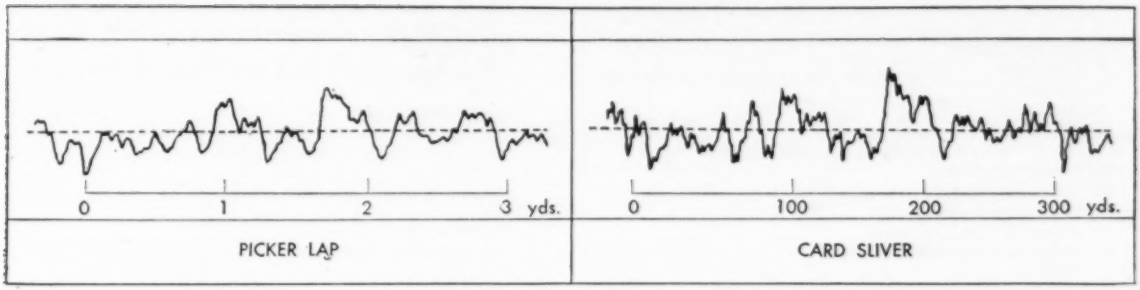
Example 1. To find the percentage of oil on a blend to be treated with 16 qts. of a 6-to-1 emulsion per 100 lbs. of blend, locate the value 16 in the column headed "Quarts per 100 lbs. of blend," and read horizontally to the column for the 6-to-1 ratio. This figure, 4.4, is the percentage of oil on the blend.

Example 2. To find the ratio and the quarts of emulsion to treat 250 lbs. of a blend so there will be 5% of oil, locate the value nearest the desired percentage of oil. The listed percentage is 5, and it comes under the 6-to-1-ratio column. On the same line, the value 18 will be found under the column headed "Quarts per 100 lbs. of blend." Because 250 lbs. of blend are to be treated,

$$18 \times \frac{250}{100} = 45 \text{ qts. of 6-to-1 emulsion}$$

14 Causes of Picker-Lap Variation

By HANS LOCHER, in TEXTILE WORLD



Fourteen basic faults that contribute to picker-lap variation are:

1. Air-flow on screen irregular; pressure in waste compartment too high
2. Chain drive of fluted rolls causes chatter
3. Level of second blending reserve varies too much. Evener belt on blending reserve slips
4. Types and speeds of beaters not best for the quality of cotton being run
5. Evener motion not free or not sensitive enough
6. Blending-feeder loading not constant
7. Lap winder not working properly as a result of bad or choked gears, binding gears, untrue shafts, etc.
8. Draft between the calender section and lap winder too high (should not exceed 6% approx.)
9. Loggerheads applying wrong or uneven tension.
10. Lap pin not running true under loggerheads
11. Loose belt, particularly evener-motion and feed-apron belts
12. Screens dirty, eccentrical, or with rough surface
13. Wrong or defective gears
14. Bent lap pins or lap-pin ends

The following standards, based on a great number of tests, are used by Uster Corp. for rating picker laps according to coefficient of variation:

Rating	CV%
Very even	2 to 3
Even	3 to 4
Average	4 to 5
Irregular	5 to 7
Very irregular	8 and up

Yardage Table for High-Compression Picker Calender Rolls

(6% stretch allowed)

Knock-off (gear teeth)	Picker lap (yards)	Knock-off (gear teeth)	Picker lap (yards)
36	55.66	54	83.48
37	57.20	55	85.03
38	58.75	56	86.58
39	60.29	57	88.12
40	61.84	58	89.67
41	63.39	59	91.21
42	64.93	60	92.76
43	66.48	61*	x
44	68.02	62	95.85
45	69.57	63	97.40
46	71.12	64	98.94
47	72.66	65	100.49
48	74.21	66	102.04
49	75.75	67	103.58
50	77.30	68	105.13
51	78.85	69	106.67
52	80.39	70	108.22
53	81.94	71	109.77

* 61-T. gear stops picker in one revolution.

Courtesy Saco-Lowell Shops

Checklist for Overhauling Pickers

(Annually or semiannually)

Once or twice a year, depending on how much preventive maintenance is done from day to day, pickers should be dismantled to the basic frame and completely overhauled. During the overhauling, all parts should be cleaned with mineral spirits. All settings should be checked and adjusted as the machine is reassembled.

Back-to-Front Checklist

If you overhaul your pickers from back to front, the following checklist—modified to suit your particular situation—may help you do a better job. The procedure was developed by a mill running 7/8-in. Strict Low to 1-in. Middling Cotton at about

375 lbs. per hr. This mill inspects, cleans, and repairs:

1. Hopper apron
2. Apron shaft and bearings
3. Back-section apron
4. Feed roll and bearings
5. Buckley beater
6. Grid bars
7. Screens
8. Leather
9. Fan blade, shaft, and bearing
10. Repeat items 4 through 10 for middle section
11. Blending reserve
12. Evener motion
13. Calender-roll section
14. Pneumatic rack release
15. Gears and oil holes

Front-to-Back Checklist

If you overhaul from front to back, here's a more detailed checklist worked out by a mill that runs ⅞- to 1-in. Strict Low Middling cotton at 460 lbs. per hr.

1. Remove all belts
2. Remove cheeks
3. Remove calender rolls
4. Remove cross-drive shaft
5. Remove drop shaft
6. Check, repair, or replace all worn bearings and gears
7. Replace all parts after cleaning, and check for freeness and level
8. Oil all bearings, and check for freeness and meshing of gears
9. Check front screens and bearings
10. Check draw rolls and bearings
11. Check air-control doors for seating
12. Check mote knives and fly bars
13. Check fan shaft and fan balance
14. Check ball bearings on beater and fan shaft
15. Open box on piano evener
16. Check lift pins and plates for freeness
17. Check feed and evener rolls and bearings
18. Check beater lags and settings to feed rolls
19. Check evener cones, belt, belt guide, and bearings
20. Check underneath cones and slides that drive back section
21. Clean and check synchronizer for freedom and smooth operation; repeat for back section
22. Check feed apron to back feed rolls
23. Check feed-hopper bearings, shafts, and aprons

CARDING (including Drawing & Combing)

Woolen-Card Production

Production (pounds per hour) of woolen cards can be calculated as follows:

$$\frac{(\pi)\ (D)\ (R)\ (E)\ (W)\ (60)}{(7000)\ (50)\ (36)}$$

where

D = drum diameter
R = drum rpm.
E = number of good ends
W = weight in grains per 50-yd. reeling

The simplified version is

$$\text{Production (lbs. per hr.)} = \frac{(\pi)\ (D)\ (R)\ (E)\ (W)}{210{,}000}$$

Courtesy Davis & Furber Machine Co.

Nine Don'ts for Carders

Don't give up too many of the old practices. For example, what happened to the bristle brush each grinder used on fillets after grinding?

Don't forget to maintain the tools and equipment used on and around the cards..

Don't let too much oil get on card clothing. This excess oil can come from traverse and drum grinders, comb boxes, cylinder bearings, etc.

Don't forget that a sharp lickerin will remove impurities that a dull lickerin will pass on through the card. Such an unnecessary load on fillets and flats shortens the life of the clothing.

Don't forget that worn feed-roll bushings and shafts cause many a jam by letting the lickerin jerk lumps through.

Don't ever beat back a raised fillet. An inch or two is all right, but anything over that is a pure gamble and actually costs more in labor than redrawing the fillet. Beating back distorts the pitch of the wire, damages the foundation, and precludes redrawing when the fillet raises again, which is the usual result after beating back.

Carding Fine Wool Noils

Breaker		Breaker-card settings	Gauge
Breast	Garnett wire		
Breast workers and strippers	Garnett wire	Breast workers and strippers to breast	28
Cylinder	110/10	Workers to cylinder	30
Workers	115/10	Strippers to cylinder	32
Doffer	115/10	Doffer to cylinder	32
Strippers	90/9	Strippers to workers	to touch lightly
Fancy	40/4 28 wire		

Intermediate		Intermediate-card settings	Gauge
Feed rolls and lickerin	Garnett wire	Lickerin to feed rolls	28
Tumbler	80/8	Tumbler to lickerin	30
Cylinder	130/11	Tumbler to cylinder	32
Doffer and workers	135/11	Workers to cylinder	32
Strippers	90/9	Strippers to cylinder	34
Fancy	40/5 29 wire	Doffer to cylinder	34
		Strippers to workers	to touch lightly

Finisher		Finisher card	Gauge
Feed rolls and lickerin	Garnett wire		
Cylinder	135/11	Feed rolls to lickerin	30
Tumbler	90/9	Lickerin to tumbler	30
Cylinder	135/11	Tumbler to cylinder	34
Tape doffer	140/13	Workers to cylinder	34
Workers	140/2	Strippers to cylinder	34
Strippers	100/10	Doffer to cylinder	35
Fancy	40/5 30 wire	Strippers to workers	to touch lightly

Don't ever grind cylinder, doffer, or flats without first checking carefully for bruises, jams, or other wire damage and correcting. Once a bruise is ground over without having been previously scraped up, you can never scrape the wire up properly. This practice leads to early shedding.

Don't set stripper rolls so deep that you knock wire forward and strip off the top layer of cotton from the foundations.

Don't set the flat-cleaning roll so deep that you strip top cotton from the flat foundation, loosen the wire in the foundation, and ruin the flats forever.

Fancy-to-Cylinder Settings on a Woolen Card

The chalking method is used to find out if the contact points of the fancy are even or if some points of the fancy are high or low. The evenness of the contact depth is highly important for a fancy because the fancy has to raise the material from the cylinder, and if the fancy is not penetrating the cylinder evenly, it takes out an uneven amount of material and causes uneven roving and yarn.

The chalk marks must be applied evenly on the cylinder and the density of the chalk has to be even. The fancy has to be ground or strickled, depending upon the unevenness of the points of the fancy clothing. More attention has to be given to a fancy covered with sheet-clothing because there is always a space between the sheets. If steady supervision does not take place here, the unevenness of contact depth can cause trouble.

Also, attention must be given to whether bands of material are sticking to the fancy. If so, the fancy is not working properly.

Steel gages are the precision instruments of the boss carder, but they must be supplemented by steady observation to see if one strip of the cylinder is filling up faster than the other. If so, this condition gives the carder notice to check the depth contact of the fancy to the cylinder.

When blends are dirty or greasy, the machine gums up even if the setting of the card is checked by precision instruments. The only help is to strip the card more often.

Lowell Technological Institute has worked out the following contact depths for chalk-strip marks:

Fancy-Settings Table
(For Davis & Furber Cards)

Chalk-strip mark	Fancy-to-card contact depth	Chalk-strip mark	Fancy-to-card contact depth	Chalk-strip mark	Fancy-to-card contact depth
	Short fibers		Medium fibers (50s to 60s)		Long, coarse fibers (36s to 48s)
2 3/8 (ins.)	0.1247 (in.)				
2 1/4	0.1118	1 1/2	0.0496		
2 1/8	0.0997	1 3/8	0.0416	7/8	0.0168
2	0.0883	1 1/4	0.0343	3/4	0.0122
1 7/8	0.0776	1 1/8	0.0278	5/8	0.0084
1 3/4	0.0675	1	0.0219	1/2	0.0053
1 5/8	0.0582				

Draft-Gear Table for Cards

Doffer, 27 ins.
Card calender-roll dia., 3.9 ins.
Lap-roll dia., 6 ins.
Coiler calender-roll dia., 2 ins.

Lap-roll gear, 48 T
Feed-roll gear, 17 T
Card calender-roll shaft gear, 25 T
Coiler shaft gear, 15 T

Doffer gear, 192 T
Feed-roll bevel gear, 160 T
Driver-coiler shaft gear, 30 T

Change gears	Compensating gears		
	37 teeth	38 teeth	39 teeth
	Draft	Draft	Draft
15 teeth	162.54	158.26	154.20
16	152.38	148.36	144.56
17	143.42	139.65	136.06
18	135.45	131.87	128.50
19	128.32	124.94	121.74
20	121.90	118.69	115.65
21	116.09	113.04	110.14
22	110.82	107.91	105.14
23	106.00	103.22	100.57
24	101.59	98.92	96.38
25	97.52	94.96	92.52
26	93.77	91.30	88.96
27	90.29	87.92	85.67
28	87.07	84.78	82.61
29	84.07	81.86	79.76
30	81.27	79.13	77.10
31	78.65	76.57	74.61
32	76.19	74.18	72.29
33	73.88	71.93	70.09
34	71.71	69.82	68.04
35	69.66	67.82	66.09
36	67.72	65.94	64.25
37	65.89	64.16	62.51
38	64.16	62.47	60.87
39	62.51	60.87	59.31
40	60.95	59.35	57.83

Courtesy Whitin Machine Works

Processing Dacron-Cotton Blends

From TEXTILE WORLD

A minimum of 65% Dacron is required in Dacron-cotton blends to get substantial performance benefits from the man-made fiber. Both 1.5- and 3.0-den. Dacron in 1½-in. staple are used with cotton to produce various yarn numbers.

Dacron staple as received is in moderately opened condition and does not require treatment in cotton-opening machinery. However, it can be processed in synthetic blenders and opening equipment.

Whenever possible, three or more bales of Dacron should be blended behind the opening or picking line.

Either one- or two-process standard synthetic or cotton pickers will process Dacron successfully. Kirschner beaters open the fibers better and give more-even laps than blade or Buckley beaters.

Staple that will be subjected to high drafts in roving and spinning should be lubricated. About 0.25 to 0.50% of the lubricant, based on the weight of the stock, can be applied by a spray at the picker hopper. For uniform application, two or more spray nozzles should be placed well above the stock as it is being fed into the hopper.

The picker settings shown in the accompanying table are suggested to prevent excessive fiber breakage and elongation.

If laps have a tendency to split during carding, the following picking suggestions may prove helpful: (1) regulate air currents in the cage section so that the bulk of the stock is deposited on the top screen; (2) use split-lap preventers behind calender rolls; (3) increase pressure on calender rolls; and (4) reduce weight on lap pin by decreasing weight on loggerhead mechanism or reducing air pressure if pneumatic loading is used.

Card Dacron Separately

Because cotton and Dacron have different properties, especially crimp and elongation, the fibers should be blended after they are picked and carded separately.

A rayon-type lickerin and a fancy roll are highly desirable for carding 1.5-den. Dacron staple. The 3-den. staple, however, can be carded without a fancy roll if optimum settings are used. These settings normally require a more-open flats-to-cylinder setting, closer doffer-to-cylinder distance and higher lickerin speeds. Cards, with a fancy, set up according to the accompanying table on card settings will produce excellent sliver from both 1.5- and 3-den. Dacron. With these settings, 3-den. staple has been carded at 8 to 10 lbs. per hr. and 1.5 den. at 5 to 6 lbs. per hr.

Blend During Drawing

Normally, the Dacron and cotton should be blended at the breaker drawing frame by placing two Dacron slivers on each side of two ends of combed cotton. The difference in fiber characteristics causes a wavy breaker-drawing sliver, but the waves will be smoothed out in finisher drawing.

If the cotton sliver tends to wrap on the top front roll, it may be necessary to rearrange the slivers so that both ends of the cotton sliver are fed together in the center. The rearrangement will minimize any unequal tensions in the web and produce a more-even sliver. The tube gear in the coiler head should be kept as clean as possible to minimize coiler-head jams.

Blends have been processed satisfactorily on both three-over-four and four-over-four drawing frames. Both breaker and finisher drawings are usually necessary to prepare a suitable sliver with a homogeneous blend for the roving frame.

Here are the recommended settings for three-over-four drawings: first to third roll, 3 ins.; third to fourth roll, 1½ ins. For four-over-four drawing, settings are: first to second roll, 1⅝ ins.; second to third roll, 1¾ ins.; third to fourth roll, 1⅞ ins.

Excellent slivers have been produced with a 1¾-in. dia. front roll running at approximately 325 rpm. Tension must be adjusted to avoid drafting the sliver

Denier, Staple, and Yarn Number To Use

Yarn number	Denier of Dacron	Cotton staple (ins.)
Up to 30/1	3.0	1⅛ combed
30/1 to 40/1	1.5	1⅛ combed
40/1 and up	1.5	1 7/16 to 1 9/16 Pima or Egyptian

Picker Settings and Speeds

Beater speeds (Kirschner)	800 to 900 rpm.
Fan speed	1,500 to 1,600 rpm.
Beater to feed roll	⅜ in. (first section)
Beater to evener pedal	5/16 in. (second section)
Sargent comb to vertical apron	3/16 in.
Lap-pin pressure	30 to 40 lbs.
Lap weight	12 oz. per yd.
Lap length	30 yds.

Card Settings and Speeds

	1.5 den., 1½ in.	3 den., 1½ in.
Clothing wire count	110s	100 to 110s
Cylinder	120s	110 to 120s
Doffer	No 1 rayon wire	No. 1 rayon wire
Lickerin	continuous knee	continuous knee
Fancy	No. 30	No. 30
Speeds (rpm.)		
Cylinder	165 to 170	165 to 176
Lickerin	400 to 450	400
Doffer	4.5 to 6.0	8 to 12
Fancy	1,525 to 1,600	1,525 to 1,600
Flats	2 ins. per min.	2 ins. per min.
Settings (0.001 in.)		
Lickerin to cylinder	0.007	0.007
Feed plate to lickerin	0.012	0.012 to 0.015
Screen to cylinder		
front	0.168	0.168
center	0.058	0.058
back	0.029	0.029
Back plate to cylinder	0.029	0.029
Front plate (top) to cylinder	0.034	0.034
Front plate (bottom) to cylinder	0.029	0.029
Flats to cylinder	0.012	0.012 to 0.015
Doffer to cylinder	0.005 to 0.007	0.005
Doffer comb to doffer	0.015	0.015
Fancy to cylinder	1 3/16-in. strip	1 1/8-in. With no fancy, use 0.022-in flats-to-cylinder setting

between the front roll and the trumpet.

It is not necessary to blend at breaker drawing. If lap-back drawing is used the sliver lapper is a good operation at which to blend.

Short- or long-draft roving equipment is suitable for processing Dacron-cotton blends. Normal front-roll speeds for cotton can be used. One-process roving is usually adequate for numbers coarser than 40s, but two or more roving processes should be used for numbers finer than 40s.

Minimum twist, just enough to keep the roving together, should be used. For best results, a number of twist levels should be tried before the final twist multiplier is decided on.

All types of cotton spinning frames, including those with conventional drafting elements, will spin Dacron-cotton blends efficiently. As in drawing and roving, the roll settings should be checked to avoid fiber stretching.

Front-roll and spindle speeds normally used for cotton are satisfactory. Travelers should be changed approximately every 72 spinning hours to prevent cut and bruised yarns.

Twist multipliers above 4.25 should be used to prevent pilling in the fabric. When fine numbers are being spun, if practical, double-creel roving should be used to improve yarn evenness.

Yarn made from Dacron-cotton blends 100% cotton or Dacron. This reduction is slightly weaker than yarns made from is caused by the differences in fiber elongation and surface characteristics of the two fibers.

Pinning Details for Various Top-Making Operations

Material	Backwasher		1st Gill		2nd Gill		1st Finisher		2nd Finisher	
	Ordinary	Intersecting	Ordinary	Intersecting	Ordinary	Intersecting	Ordinary	Intersecting	Ordinary	Intersecting
Merino wools 60/70s										
Pitch of screw	1/2 in.	7/16 in.	7/16 in.	7/16 in.	7/16 in.	7/16 in.	3/8 in.	3/8 in.	3/8 in.	3/8 in.
Number of rows of pins	2	1	2	1	2	1	2	1	2	1
Pins per inch	11	10	11	11	12	12	16	16	18	18
Fine crossbred up to 56s										
Pitch of screw	5/8 in.	5/8 in.	1/2 in.	1/2 in.	1/2 in.	1/2 in.	7/16 in.	7/16 in.	7/16 in.	7/16 in.
Number of rows of pins	2	1	2	1	2	1	2	1	2	1
Pins per inch	8	8	9	9	10	10	11	11	13	13
Medium crossbred 46/50s										
Pitch of screw	3/4 in.	....	5/8 in.	....	5/8 in.	....	1/2 in.	....	1/2 in.	....
Number of rows of pins	2	....	2	....	2	....	2	....	2	....
Pins per inch	6	....	8	....	10	....	10	....	12	....

Courtesy International Correspondence Schools

Cotton Fiber Graph for Combing

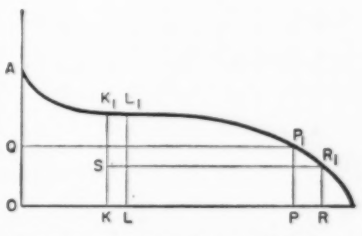
To use this combing chart, the line AO on the longest fiber is halved at Q. A line parallel to the base line cuts the curved portion at P_1. A perpendicular line is then dropped from P_1 to cut the base line at P.

The distance from O to P is measured, and the perpendicular K is drawn at one-quarter the distance from O to P. KK_1 is halved at S, and another line is drawn parallel to the base line to cut the curved portion of the graph at R_1. A perpendicular line is dropped to R.

The distance OR is measured, and a one-quarter the distance the point L is placed. A perpendicular is drawn to L_1. This distance LL_1 is measured and called the effective fiber length. The distance KK_1 is called the first approximation of the effective fiber length.

The effective fiber length could be used in adjusting drafting rolls and to compare (1) fibers fed to a comber, (2) fibers delivered as combed sliver, and (3) fibers rejected as noil.

With correctly adjusted combers, you could expect the effective fiber length of the combed sliver to be longer than the effective fiber length of the stock fed to the machine. You should also expect the effective fiber length of the noil to be much less than the effective fiber length of the stock fed.



EFFECTIVE FIBER LENGTH is vertical line at LL_1 that can be used to adjust drafting rolls and compare fibers on a comber.

ROVING

Combed-Roving Twist Nomograph

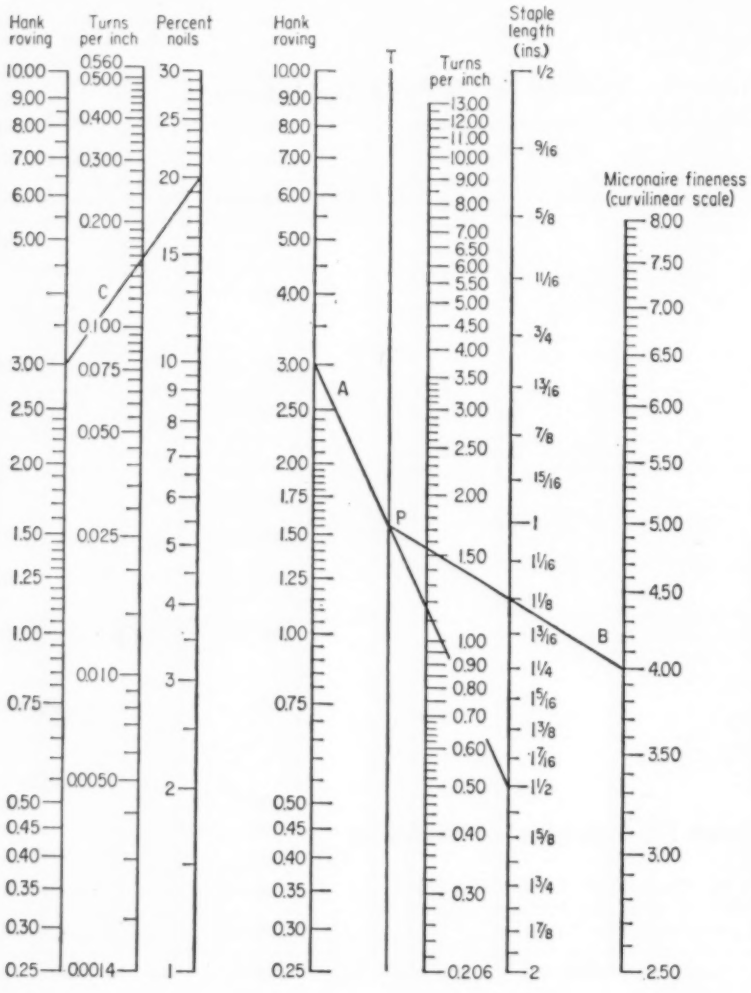
To use the nomograph for combed roving twist, assume you have a 3-hk. roving made from 1½-in. cotton with a Micronaire fineness of 4.00 and a noil removal of 20%.

Connect the hank roving number with the staple length (Line A). Intersect Line T at P, and connect P with the fineness number (Line B).

Line B intersects the twist line at 1.54, the correct number of turns per inch for 3-hk. roving with zero noils removed.

Then, on the adjacent chart draw a line from the hank-roving number to the percent noils. In this instance the twist line is intersected at 0.16. Subtract this figure from the zero noils figure (1.54—0.16= 1.38) and you have the correct twist.

Courtesy Southern Regional Research Laboratory, USDA



Production Formula For Roving

Number of spindles	Constant
60	0.118
64	0.126
66	0.130
68	0.134
70	0.138
72	0.142
74	0.146
76	0.150
78	0.154
80	0.158
82	0.162
84	0.166
86	0.170
88	0.174
90	0.178
92	0.182
94	0.186
96	0.190
98	0.194
100	0.198
102	0.202
104	0.206
106	0.210
108	0.214
110	0.218
112	0.222
114	0.226
116	0.230
118	0.234
120	0.238

Here is a simple formula that will enable you to readily calculate 100% production per hour on roving with any number of spindles from 60 to 120, running on either cotton or worsted. Worsted-roving production is figured here in cotton hanks.

S equals the spindle speed, T the twist per inch, and N the hank roving. Then $\frac{S \times C}{T \times N}$ = 100% production in pounds per hour. C is a constant that varies with the number of spindles on roving frames producing 840-yd. hanks.

For example, to determine the production of a 120-spindle, 10x5 roving frame making a 2.00-hk. roving with a 0.90 twist multiplier and a spindle speed of 700 rpm., the calculation is as follows:

$$\frac{700 \times 0.238}{1.27 \times 2} = 65.5 \text{ lbs.}$$

Courtesy Saco-Lowell Shops

Tables for Card-Room Calculations

By **N. H. POMFRET**, in TEXTILE WORLD

Here are four roving tables and one drawing table that greatly simplify card-room mathematics.

Table 1 shows at a glance the correct turns per inch required to produce different twist factors in roving made from either cotton or man-made fibers. Turns per inch are read directly in the twist-factor column opposite the hank-roving number.

Examples: A 1.50-hk. roving with a 1.10 twist factor has 1.332 tpi.

Table 2 is used in conjunction with Table 1 to determine the correct twist gear for a hank roving with a specified twist factor.

Example: To produce a 1.75-hk. roving with a 1.20 twist factor, 1.58 tpi. is necessary, as shown by Table 1. The turns-per-inch figure nearest 1.58 is 1.60 in Table 2. The twist-gear column opposite 1.60 tpi. indicates that a 44-tooth gear is needed.

Table 3, based on a formula developed by the Southern Regional Research Laboratory for 1-in. cotton, makes it easy to find the proper number of turns per inch for roving made from cotton with different characteristics.

The factor obtained by reading across from the Micronaire-number column to the hank-roving column is divided by the staple length to give turns per inch.

Example: To find the turns per inch for 3-hk. roving made from 1⅛-in. cotton with a 4.2 Micronaire number, the calculation is: 2.122 (tpi. for 1-in. cotton) ÷ 1⅛ (ins.) = 2 tpi.

Find Production at Any Speed

Table 4 is used to determine fly-frame production in pounds per hour at any roll speed. This table, prepared specifically for 136-spindle frames with 1¼-in. rolls, can be modified to suit local conditions.

Opposite each hank roving is the production (pounds per hour) at front-roll speeds of 1 to 9 rpm. Production at any roll speed can be determined by adjusting decimal points and making a simple calculation as shown in the example.

Example: To find production per frame per hour of a 4-hk. roving where front-roll speed is 124 rpm. and frame efficiency is 86%, the calculation is:

100 rpm. = 26.50 lbs. (Col. 1)
20 rpm. = 5.30 lbs. (Col. 2)
4 rpm. = 1.06 lbs. (Col. 4)

124 rpm. = 32.86 lbs. (100%)
0.86 × 32.86 = 28.26 lbs. (86%)

Table 1—Turns per Inch for Roving Twist Factor

Hank roving	Twist factor 0.75	0.80	0.90	1.00	1.10	1.20	1.30
0.50	0.530*	0.566	0.636	0.7071	0.778	0.848	0.919
0.60	0.581	0.619	0.697	0.7747	0.852	0.929	1.007
0.75	0.649	0.693	0.779	0.8660	0.952	1.039	1.126
1.00	0.750	0.800	0.90	1.0000	1.100	1.200	1.300
1.25	0.838	0.894	1.00	1.118	1.230	1.341	1.453
1.50	0.908	0.967	1.09	1.211	1.332	1.452	1.574
1.75	0.922	1.05	1.119	1.323	1.455	1.587	1.712
2.00	1.06	1.13	1.27	1.415	1.556	1.698	1.839
2.50	1.18	1.26	1.42	1.581	1.739	1.897	2.055
3.00	1.30	1.38	1.56	1.732	1.905	2.078	2.251
4.00	1.50	1.60	1.80	2.000	2.200	2.400	2.600
5.00	1.67	1.79	2.01	2.237	2.460	2.684	2.908
6.00	1.83	1.96	2.20	2.450	2.695	2.940	3.185

* Turns per inch.

TURNS PER INCH required to produce a definite twist factor in roving are obtained by reading this table directly.

Table 2—Roving Twist Gears for 70.8 Twist Constant

Twist gear	Turns per inch		
21	3.34	39	1.81
22	3.21	40	1.77
23	3.07	41	1.72
24	2.95	42	1.68
25	2.83	43	1.64
26	2.72	44	1.60
27	2.62	45	1.57
28	2.52	46	1.54
29	2.44	48	1.47
30	2.36	50	1.41
31	2.28	52	1.36
32	2.21	54	1.31
33	2.14	56	1.26
34	2.08	58	1.22
35	2.02	60	1.18
36	1.97	62	1.14
37	1.91	65	1.08
38	1.86	70	1.01

TWIST GEAR required to produce a specific twist factor is designated by this table where the turns per inch are known.

Table 3—Roving Twist for 1-in. Cotton

Micronaire number	Hank Roving 0.75	1.00	1.50	2.00	3.00	4.00	5.00	6.00
3.5	0.8966*	0.9315	1.221	1.479	1.937	2.347	2.725	3.076
3.6	0.9093	0.9448	1.238	1.500	1.964	2.381	2.763	3.120
3.7	0.9219	0.9579	1.255	1.521	1.993	2.414	2.801	3.163
3.8	0.9344	0.9707	1.272	1.541	2.018	2.446	2.839	3.206
3.9	0.9464	0.9833	1.288	1.561	2.045	2.478	2.876	3.247
4.0	0.9585	0.9959	1.305	1.581	2.071	2.509	2.912	3.289
4.1	0.9705	1.008	1.321	1.601	2.097	2.541	2.948	3.330
4.2	0.9822	1.021	1.338	1.620	2.122	2.571	2.984	3.370
4.3	0.9938	1.032	1.353	1.639	2.147	2.602	3.019	3.410
4.4	1.006	1.044	1.369	1.656	2.172	2.632	3.054	3.449
4.5	1.016	1.056	1.395	1.678	2.197	2.662	3.089	3.488
4.6	1.028	1.068	1.400	1.695	2.221	2.692	3.123	3.537
4.7	1.039	1.079	1.415	1.714	2.245	2.720	3.156	3.565
4.8	1.050	1.091	1.430	1.732	2.269	2.749	3.190	3.602
4.9	1.061	1.103	1.444	1.750	2.293	2.777	3.223	3.640
5.0	1.072	1.114	1.459	1.768	2.316	2.806	3.256	3.677

* Turns per inch.

TURNS PER INCH of roving made from 1-in. cotton are used in determining turns per inch for other staple lengths.

Table 5—Drawing-Frame Production

Hanks	Sliver weight (grains per yard) 50	55	60	65	70
1	6*	6.6	7.2	7.8	8.4
2	12	13.2	14.4	15.6	16.8
3	18	19.8	21.6	23.4	25.2
4	24	26.4	28.8	31.2	33.6
5	30	33.0	36.0	39.0	42.0
6	36	39.6	43.2	46.8	50.4
7	42	46.2	50.4	54.6	58.8
8	48	52.8	57.6	62.4	67.2
9	54	59.4	64.8	70.2	75.6

* Pounds per hank

DRAWING-FRAME PRODUCTION can be calculated by adjusting the decimal point. For example, 200 60-grain hanks weigh 1,440 lbs.

Table 4 also can be used to determine the specific number of frames or production hours needed to produce a definite amount of roving.

Example: To find the number of frames running at 80% efficiency needed to produce 16,000 lbs. of 2-hk. roving in 80 hrs. where front-roll speed is 118 rpm., the calculation is:

100 rpm. = 52.90 lbs. (Col. 1)
10 rpm. = 5.29 lbs. (Col. 1)
8 rpm. = 4.23 lbs. (Col. 8)

118 rpm. = 62.42 lbs. (100%)

$0.80 \times 62.42 = 49.93$ lbs. (80%)

$$\frac{16{,}000 \text{ (lbs.)}}{50 \text{ (lbs.)} \times 80 \text{ (hrs.)}} = 4 \text{ frames}$$

Example: To find the number of production hours required for the same four frames to produce 12,000 lbs. of roving, the calculation is:

$$\frac{12{,}000 \text{ (lbs.)}}{50 \text{ (lbs.)} \times 4 \text{ (frames)}} = 60 \text{ hrs.}$$

How To Use Drawing Table

Drawing-frame production usually is expressed in hanks. This measure is convenient for calculating wages, but it must be converted to pounds for use in production calculations. Table 5 is designed to aid in this calculation.

Example: To find the weight of 228 hanks of 60-grain sliver, the calculation is:

200 hks. = 1,440 lbs.
20 hks. = 144 lbs.
8 hks. = 57.6 lbs.

228 hks. = 1,641.6 lbs.

Table 4—Fly-Frame Production

Hank roving	Front-roll speed (rpm.) 1	2	3	4	5	6	7	8	9
0.50	2.119*	4.238	6.357	8.476	10.595	12.714	14.833	16.952	19.071
0.60	1.766	3.532	5.298	7.064	8.830	10.596	12.362	14.128	15.894
0.75	1.413	2.826	4.239	5.652	7.065	8.478	9.891	11.304	12.717
1.00	1.059	2.118	3.177	4.236	5.295	6.354	7.413	8.472	9.531
1.25	0.847	1.694	2.541	3.388	4.235	5.082	5.929	6.776	7.623
1.50	0.706	1.412	2.118	2.824	3.530	4.236	4.942	5.648	6.354
1.75	0.605	1.210	1.815	2.420	3.025	3.630	4.235	4.840	5.445
2.00	0.529	1.058	1.587	2.116	2.645	3.174	3.703	4.232	4.761
2.50	0.423	0.846	1.269	1.692	2.115	2.538	2.961	3.384	3.807
3.00	0.353	0.706	1.059	1.412	1.765	2.118	2.471	2.824	3.177
4.00	0.265	0.530	0.795	1.060	1.325	1.590	1.855	2.120	2.385
5.00	0.212	0.424	0.636	0.848	1.060	1.272	1.484	1.696	1.908
6.00	0.177	0.354	0.531	0.708	0.885	1.062	1.239	1.416	1.593

* Production per frame (lbs. per hr.)

FLY-FRAME PRODUCTION shown here is for a 136-spindle frame running at 100% efficiency. Front-roll diameter is 1¼ ins.

Chart Speeds Up Evenness Testing

By HUGH L. JONES, in TEXTILE WORLD

The accompanying diagram was developed for use in conjunction with the Uster evenness tester; it shows various combinations of chart speeds in relation to material speeds. Proper use of the diagram facilitates the calculation of cycle lengths and assists in determining the best combination of speeds to show a cycle to its best advantage.

When a cycle is suspected and you want to recognize it on the Uster chart, you must first determine the number of cycles per inch that can be read easily. For example, if three cycles per inch are to show on the chart, multiply the actual cycle in the material by three. Then locate the standard for 1 in. of chart on the diagram that is nearest the result of the calculation. To determine the exact length on the chart, divide the actual cycle length in the material by the 1-in. standard on the chart.

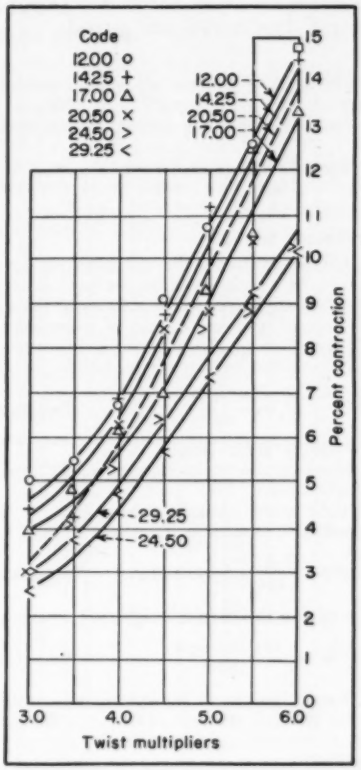
Assume that a yarn has a 23.56-in. cycle. At a material speed of 25 yds. per min. and a chart speed of 20 ins. per min., 45 ins. of material shows on 1 in. of chart. In other words, 23.56 ÷ 45 = 0.5 ins. of cycle on the chart.

Working back, if you multiply the cycle length on the chart by the constant at the speeds being used, you can determine the length of the cycle in the material.

Twist Multipliers for Maximum Skein Strength

Classer's staple length (ins.)	Twist multiplier
3/4	5.35
25/32	5.15
13/16	5.00
27/32	4.85
7/8	4.70
29/32	4.60
15/16	4.45
31/32	4.35
1	4.25
1 1/32	4.20
1 1/16	4.10
1 3/32	4.05
1 1/8	3.95
1 5/32	3.90
1 3/16	3.85
1 7/32	3.80
1 1/4	3.75
1 9/32	3.70
1 5/16	3.65

The above spinning twist multipliers should result in maximum yarn strength regardless of yarn number. This information is the result of work conducted in the Clemson Laboratory of the Cotton Branch of the Agricultural Marketing Administration.



Thread Twist Multipliers

Turns per inch in thread yarn is dependent on the size of the single yarn and the staple length of the cotton. As yarns become finer, they require more twist in proportion to the square root of the yarn number.

Twist multipliers of 4.75 are generally used for sewing threads made from 1-in. cotton. Long-staple cotton fibers tend to bind themselves together better than short-staple cotton fibers, and less-than-standard twists are generally used for fibers over 1 in. and more for fibers less than 1 in.

The customary rule is to decrease the multiplier by 0.05 for every 1/8 in. over 1-in. staple cotton and increase the multiplier 0.05 for every 1/8 in. under 1-in staple cotton. Many manufacturers, however, do a lot of experimenting to find out the best twist multiplier for a particular cotton and yarn.

Cotton yarns for sewing threads are usually combed, and the following staple lengths are used for the various yarn numbers:

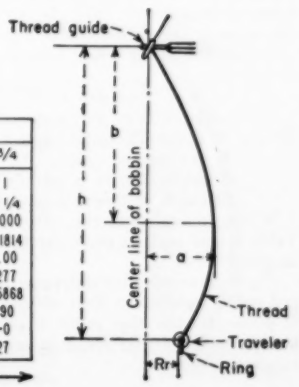
40s to 60s—1 1/8- to 1 1/4-in. staple
60s to 70s—1 1/4- to 1 3/8-in. staple
70s to 80s—1 3/8- to 1 1/2-in. staple
80s to 100s—1 1/2- to 1 5/8-in. staple

Multipliers for ply yarns range between 1.5 and 8, but this multiplier depends on the twist in the single yarn, the number of yarns plied, and the characteristics desired in the ply yarn. When there are numerous ends plied, the twist multipliers will be in the lower range.

Ring Size, Traveler Speed, and Tension

	Ring diameter in inches									
	1 3/4	1 3/4	1 3/4	1 7/8	1 7/8	1 7/8	2	2 3/16	2 3/8	2 3/4
Bobbin dia. in inches	1/2	1/2	1/2	1/2	1/2	1/2	5/8	3/4	7/8	1
Gauge	3 3/4	3 3/4	3 3/4	3 3/4	3 3/4	3 3/4	3 3/4	3 3/4	4	4 1/4
Spindle speed	9,000	10,000	11,000	9,000	10,000	11,000	11,000	10,000	9,000	8,000
"a" in meters	.1621	.1462	.1328	.1621	.1462	.1328	.1328	.1462	.1621	.1814
"h" in inches	10.80	9.73	8.84	10.60	9.58	8.71	8.58	9.25	10.37	11.00
"b" in meters	.273	.247	.224	.270	.243	.221	.218	.235	.264	.277
Wt. of trav. in grams	.07350	.06229	.05243	.06720	.05587	.04702	.04756	.05360	.06086	.05868
Approx. wt. of trav. in grains	1.20	1.00	0.80	1.10	0.85	0.75	0.75	0.85	0.95	0.90
Approx. number of trav.	1 1/2	1	2-0	1 1/2	1 1/2-0	3-0	3-0	1 1/2-0	1/2	1-0
Yarn tension in grams	27	27	27	27	27	27	27	27	27	27

Relationship between dimensions of yarn balloon used in table →



Traveler Selection

By JOHN DUERST, in TEXTILE WORLD

The main factors in selecting travelers are spindle speed, ring size, weight of travelers, and yarn strength. In addition, two intangible factors—traveler friction and traveler air resistance—must be considered.

While not measurable to date, it is known that the last two quantities plus the centrifugal force should in no case exceed the yarn or thread strength.

Centrifugal Force Equals Strength

At zero friction and air resistance, the maximum employable centrifugal force should be exactly equal to the yarn or thread strength as its counter force. Expressed as a formula, the equation is: Centrifugal force of revolving traveler at nonexistent air resistance and friction = yarn or thread strength (Equation 1).

The centrifugal force exerted by a revolving traveler is:

$$F = \frac{WRN^2}{494} \qquad \text{(Equation 2)}$$

Where F is the centrifugal force (lbs.)
W is the theoretical maximum traveler weight (grains)
R is the ring diameter (ins.)
N is the spindle speed (rpm. in thousands)

The values of Equation 2 inserted in Equation 1 give:

$$F = \frac{WRN^2}{494} = \text{strength} \qquad \text{(Equation 3)}$$

Since the object is to find the traveler weight, the equation is:

$$W = \frac{494\ (\text{strength})}{RN^2} \qquad \text{(Equation 4)}$$

Here, W is the traveler weight at nonexistent air resistance and friction matching the full strength of the yarn thread.

In actual practice, air resistance and friction play a great part; and traveler weight should never be chosen to match the full strength of the strand.

Since air resistance and friction and the proper margin between centrifugal force and strength are factors that cannot at this time be measured, the next step is to compare the theoretical traveler weight (Equation 4) with actual traveler weights.

The general empirical formula for all types of traveler is:

$$W_a = AW^n$$

or

$$W_a = A\left(\frac{494 \times \text{strength}}{RN^2}\right)^n \qquad \text{(Equation 5)}$$

Where W_a is the actual traveler weight (grains)
A is a constant, characteristic of the traveler
n is the exponent of curve that reflects air resistance and friction
Strength for thread is pounds per single-strand break; for yarn, strength is pounds per 120 yds. ÷ 100

For the technically minded overseer of spinning or twisting, the constants and exponents for Equation 5 are listed for three main types of travelers in Table 1. For quick reference, involving a minimum of calculation, Table 2 shows traveler weight and ratios.

To use the tables, insert known values in this equation:

$$\text{Ratio} = \frac{494\ (\text{strength})}{RN^2}$$

Where N is spindle speed (rpm.) ÷ 1,000
R is ring size (ins.)
Strength of yarn is pounds break per 120 yds. ÷ 100
Strength of thread is pounds break per single strand

When you calculate the ratio, find the nearest figure to it in Table 2 and read to the right to determine the proper traveler weight.

There is considerable difference between the weights of bronze and nylon travelers. Often, overseers are tempted to use a nylon or plastic traveler that is too heavy. Use of these tables and a tension meter should result in selecting the right size of nylon traveler.

Table 1—Constants and Exponents for Three Kinds of Traveler

Traveler	Traveler material	Ring flange (number)	Ring depth (ins.)	Constant (A)	Exponent (n)
Spinning	Steel	1	.....	0.266	1.145
Twisting	Bronze	1	11/16	0.959	0.909
Twisting	Nylon	1	11/16	0.700	0.667

Table 2—Weights of Steel, Bronze, and Nylon Travelers

Ring frames (No. 1 flange rings)		Twisters (43/64- or 11/16-in. ring depth)		
Ratio	Steel traveler (grains)	Ratio	Bronze traveler (grains)	Nylon traveler (grains)
0.9	0.235	1	0.95	0.70
1.0	0.266	2	1.80	1.11
1.1	0.295	3	2.60	1.46
1.2	0.325	4	3.37	1.77
1.3	0.357	5	4.13	2.06
1.4	0.390	6	4.88	2.32
1.5	0.420	7	5.61	2.58
1.6	0.455	8	6.34	2.82
1.7	0.485	9	7.05	3.05
1.8	0.520	10	7.76	3.27
1.9	0.555	15	11.2	4.30
2.0	0.59	20	14.6	5.21
2.5	0.76	25	17.8	6.05
3.0	0.94	30	21.1	6.83
3.5	1.13	35	24.2	7.58
4.0	1.30	40	27.4	8.29
4.5	1.52	45	30.5	8.97
5.0	1.70	50	33.5	9.62
6.0	2.07	60	39.6	10.9
7.0	2.47	70	45.5	12.1
8.0	2.88	80	51.4	13.2
9.0	3.30	90	57.2	14.3
10.0	3.72	100	62.9	15.3
15.0	6.02	150	91.0	20.1
20.0	8.70	200	118.0	24.4
25.0	11.20	250	145.0	28.3
30.0	14.00	300	171.0	32.0
35.0	16.70	350	196.0	35.5

Balanced Spinning Production

The length of yarn in yards per bobbin from the spinning frame and the winding or unwinding speed of the spooler or winder in yards per minute are the important factors in balancing spinning production.

The yards on the bobbin divided by the unwinding speed gives the number of minutes to unwind each bobbin.

The circumference of the drum in yards multiplied by the speed of the drum gives the winding speed in yards per minute. The yards per bobbin is obtained by weighing about 12 bobbins from various doffs of the same yarn number.

Deduct the weight of the empty bobbins and divide the total net weight by the number of bobbins weighed for the average net weight of one full bobbin. Multiply this weight in ounces by 52.5 and the yarn number. The product equals the number of yards per bobbin.

For example, suppose a bobbin with 6 oz. of 24s yarn sizes at 24.06. The yards on the bobbin = 6x52.5x24.06
= 7,579 yds.

With a drum speed of 1,080 yds. per min., this bobbin unwinds in 7,579 ÷ 1,080 = 7.01 mins.

The best operating economy calls for putting as many yards as possible on the spinning bobbin. Increased yardage means less downtime and labor for doffing and fewer bobbins handled by the winder operator. Drum speeds or cycle adjustments on the spooler or winder can be made to give the best results for the yardage on each spinning bobbin for every yarn number run.

This method of coordinating production does not require consideration of doffing times, front-roll speeds, turns per inch, contraction, or layer density.

Spinning-Twist Contraction Table for Determining Draft Change Gears

This twist-contraction table helps in determining the change gear needed for a desired yarn number. Actual draft is determined by dividing the desired yarn number (multiplied by two if double roving is used) by the hank of roving in the creel. Percentage of contraction is read directly from the table for the desired twist multiplier. Actual draft is multiplied by one plus twist contraction. The draft constant, divided by the gear draft secured in this way, gives the gear needed for the desired yarn number. Actual yarn number and actual hank roving should be used.

Twist multiplier	% contraction	Twist multiplier	% contraction
3.00	3.10	4.05	5.85
3.05	3.25	4.10	6.00
3.10	3.40	4.15	6.15
3:15	3.53	4.20	6.30
3.20	3.65	4.25	6.43
3.25	3.78	4.30	6.55
3.30	3.90	4.35	6.68
3.35	4.03	4.40	6.80
3.40	4.15	4.45	6.93
3.45	4.28	4.50	7.05
3.50	4.40	4.55	7.20
3.55	4.55	4.60	7.35
3.60	4.70	4.65	7.48
3.65	4.83	4.70	7.60
3.70	4.95	4.75	7.73
3.75	5.08	4.80	7.85
3.80	5.20	4.85	8.00
3.85	5.35	4.90	8.15
3.90	5.50	4.95	8.28
3.95	5.60	5.00	8.40
4.00	5.70		

Traveler Speed (ft. per min.)

Spindle speed (rpm.)	6,000	7,000	8,000	9,000	10,000
Ring dia. (ins.)					
2	3,150	3,675	4,200	4,700	5,225
2 1/4	3,525	4,125	4,700	5,300	5,900
2 1/2	3,925	4,575	5,225	5,875	6,550
2 3/4	4,325	5,025	5,750	6,450	7,200
3	4,700	5,500	6,275	7,050	7,850

Courtesy Victor Ring Traveler Co.

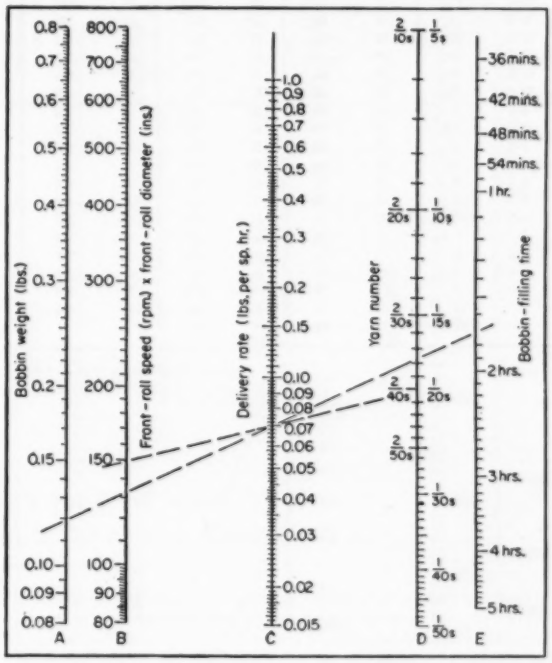
Delivery Rate and Bobbin-Filling Time for Worsted Yarns

With this nomograph by Morris C. Bishop you can determine bobbin-filling time without any calculations. The final answer is gotten after you determine, in an intermediate step, the delivery rate in pounds per spindle hour.

EXAMPLE. Locate yarn number (1/20s) in Column D. Multiply front-roll speed (rpm.) by front-roll diameter (ins.) and locate this figure in Column B. In this case, 37.5 rpm. x 4 ins. gives a value of 150. Draw a line from the point in Column D to the point in Column B, and note where the line crosses Column C.

This value in Column C gives the delivery rate in pounds per spindle hour (0.07 in the example). Locate average bobbin weight (lbs.) in Column A. In this case 100 bobbins have a net weight of 12 lbs.; so average bobbin weight is 0.12 lbs.

Draw a second line from the point in Column A, through the point in Column C, to Column E. The intersection point in Column E gives the bobbin-filling time, 1.7 hrs. (1 hr, 42 mins.) in the example.



Weight of Traveler

The following formula serves as a starting point for figuring the proper weight of the new traveler when you change from one yarn number to another. Such factors as quality of stock, diameter of ring, etc. have to be taken into consideration; but use of the formula will save time

FORMULA:

$$\frac{\text{number of yarn being spun} \times \text{weight in grains of 10 of travelers being used}}{\text{number of yarn to be spun}} = \text{weight in grains of 10 of travelers to be used}$$

EXAMPLE: If you change from 30s to 20s yarn:

$$\frac{\text{30s (yarn being spun)} \times \text{6 grains. (weight in grains of 10 of travelers being used—6–10)}}{\text{20s (yarn to be spun)}} = \text{9 grains. (for 10 travelers), or a 1-0 traveler.}$$

Traveler Numbers and Weights

(Round- or square-pointed travelers)

Traveler No.	Weight (grains per 10 travelers)	Traveler No.	Weight (grains per 10 travelers)	Traveler No.	Weight (grains per 10 travelers)	Traveler No.	Weight (grains per 10 travelers)
28-0	¼	3	12	36	84	69	150
27½-0	⅝	4	13	37	86	70	152
27-0	½	5	14	38	88	71	154
26-0	¾	6	16	39	90	72	156
25-0	1	7	18	40	92	73	158
24-0	1¼	8	20	41	94	74	160
23-0	1½	9	23	42	96	75	162
22-0	1¾	10	26	43	98	76	164
21-0	2	11	30	44	100	77	166
20-0	2¼	12	33	45	102	78	168
19-0	2½	13	36	46	104	79	170
18-0	2¾	14	39	47	106	80	172
17-0	3	15	42	48	108	81	174
16-0	3¼	16	44	49	110	82	176
15-0	3½	17	46	50	112	83	178
14-0	3¾	18	48	51	114	84	180
13-0	4	19	50	52	116	85	182
12-0	4¼	20	52	53	118	86	184
11-0	4½	21	54	54	120	87	186
10-0	4¾	22	56	55	122	88	188
9-0	5	23	58	56	124	89	190
8-0	5¼	24	60	57	126	90	192
7-0	5½	25	62	58	128	91	194
6½-0	5¾	23	64	59	130	92	196
6-0	6	27	66	60	132	93	198
5-0	6½	28	68	61	134	94	200
4-0	7	29	70	62	138	95	202
3-0	7½	30	72	63	138	96	204
2-0	8	31	74	64	140	97	206
1½-0	8½	32	76	65	142	98	208
1-0	9	33	78	66	144	99	210
1	10	34	80	67	146	100	212
2	11	35	82	68	148		

Courtesy Victor-Ring Traveler Co.

How To Check Draft Gears

By ERNEST R. BECKNER, in TEXTILE WORLD

To check draft gears on spinning frames without stopping the frames or soiling the hands with black grease, obtain a piece of chalk, stopwatch, pad, and pencil. Place a chalk mark on the back roll between bosses.

Start the watch as soon as this mark comes up; the next appearance is counted as "one". Count 30 revolutions, stop the watch, and record this time as minutes per 30 revolutions of the back roll. Mark the front roll with a quick jab of the chalk, and time this roll for 150 revolutions.

Convert both figures to revolutions per minute by dividing the revolutions by the minutes. If front and back rolls are not the same diameter, multiply the revolutions per minute of each roll by its diameter in inches. Then divide the revolutions per minute of the front roll by the revolutions of the back roll to get the mechanical draft. Next, divide the draft constant by the mechanical draft to get the draft gear being used. Here's an example:

Back roll (mins. per 30 rev.)..... 2.24
Front roll (mins. per 150 rev.)..... 0.85
Draft constant 737

$$\frac{150}{0.85} \div \frac{30}{2.24} = 13.17 \text{ draft}$$

737÷13.17=56.1, or 56 draft gear

How To Spot Periodic Variations

By E. J. BERNET, G. Z. DUNN, JR., and W. C. HARRIS, in TEXTILE WORLD

There are certain settings, such as pen average, pen sensitivity, chart speed, and material speed, which can be used on the Brush uniformity analyzer to assist in the search for periodic variations. The particular setting to use in searching for periodicities is generally dependent upon the distance between the expected periodic variations.

For closely spaced periods (3 ins. to 10 ins.) in the material, a fast chart speed (25 mm. per sec. to 125 mm. per sec.) and the pen average at position 0 or 1 are generally used. A slow chart speed (5 mm. per sec.) and the pen average at position 2 or 3 will indicate longer periodic variations. The pen sensitivity control is usually used to increase the amplitude of the variations on the chart after the pen average and chart speed have been selected.

There are many mechanical faults in fiber processing that cause periodic variations. An eccentric roll or gear on a drawing, roving, or spinning frame can cause a wavy pattern of thick and thin places in the stock.

A pattern formed in the material by a flat spot on the top roll is dependent upon the roll position on that particular frame. A flat spot in the back-roll position has very little effect, but in the third-roll position on a four-roll frame it causes a thin place directly followed by a thick place. A defective front roll causes periodic thick places in the material.

Defective bottom rolls on the drawing frame affect the sliver differently, depending upon the position on the frame. Defective drafting rolls used primarily as delivery rolls have a greater effect on the resulting sliver than defective rolls used as feed rolls do.

Most of these mechanical faults have a particular pattern that can be distinguished by proper use of the uniformity analyzer.

Standard Values of Coefficient of Variation

Standard values for the average irregularity are difficult to determine because it is not possible to consider all the factors that influence irregularity in a sample chart.

Fiber fineness, staple length, spinning process, and machine

types all influence the quality of the yarn. The influence in each case is not known. To make the standard values as universal as possible, fiber fineness has been considered as one of the most important factors.

The irregularity values are grouped into three quality classes—very even, average, and uneven. This grading was intentionally chosen coarser than the differences that produce considerable quality differences in weaving and knitting.

Woolen Spinning

Yarn No. (256 yds. per lb.)	Very even (%)		Average (%)		Uneven (%)	
	20 to 23 microns	27 to 30 microns	20 to 23 microns	27 to 30 microns	20 to 23 microns	27 to 30 microns
8	8.5	11.3	10.6	14	14.1	18.7
12	9.7	12.9	12.2	16.2	16.2	21.4
16	10.9	14.4	13.4	17.8	17.6	23.3
20	11.7	15.5	14.2	18.8	19	25.2
23	12.5		15		20	
29	13.7		16.2		21.5	
39	15		18		23.8	

YARN HANDLING

Yardage Graph For Cheeses

By GENE G. FLOYD
in TEXTILE WORLD

Here's how to help frame fixers determine yardage on cheeses without mathematical calculations:

Plot a graph of the different yarn numbers run, with the weight in pounds and ounces on the abscissa and the yardage on the ordinate. Each small square represents 2 oz. on the abscissa and 2,000 yds. on the ordinate. The graph is easily read and accurate enough for general purposes.

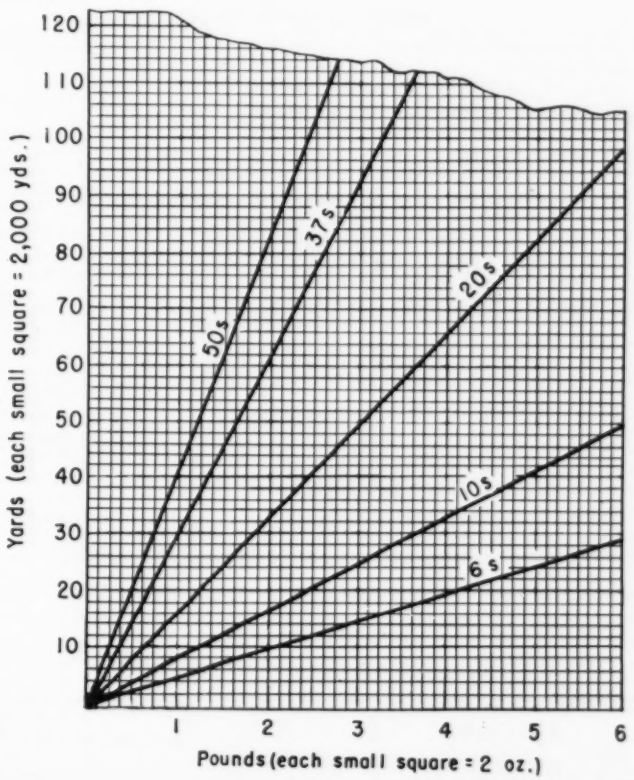
On this graph, there are five straight lines representing the numbers run; any number of yarn sizes can be added to meet individual needs.

The lines are drawn by plotting the points for three different weights and their yardage for each yarn number. For example:

1 lb. of 10s has $10 \times 840 = 8{,}400$ yds.

2 lbs. of 10s has $2 \times 10 \times 840 = 16{,}800$ yds.

3 lbs. of 10s has $3 \times 10 \times 840 = 25{,}200$ yds.



How To Calculate Production on Filling Winders

By DEANE R. QUINTON, in TEXTILE WORLD

Here is how we figured productivity on our filling winders:

Production and Spindle Speed

Production is directly in proportion to spindle speed. Here are actual figures: On 150-den. rayon (35.43 cotton-number equivalent) at 5,200 rpm., a spindle will fill a 7⅞-in. bobbin with 2,035 yds. of yarn in 6.033 mins. This yardage weighs 480 grains.

The following table shows production at different speeds (assuming 100% efficiency in winding):

A (rpm.)	B (yds.)	C (mins.)	D (lbs.)
5,200	337.31	6.033	27.17
12,500	810.89	2.510	65.31
15,000	973.14	2.091	78.37

A = spindle speed; B = average yards per minute; C = minutes to fill the bobbin; D = production per spindle per 40 hrs.

From this table, the basic figure of yards per minute can be used in direct proportion for any size of yarn.

Productivity of Operators

An operator must replace run-out supply packages, tie up broken ends, start up spindles that miss on the doff, see that the winder has enough empty pinboards, call for empty bobbins when needed, and pick up and clean around the area of her machines. If she doesn't do these things, someone else has to; so it is all a part of winding cost.

Here is our breakdown of an operator's duties:

Replacing supply packages	24 (mins.)
Spindle attendance	27
Fatigue allowance	9
	60 mins.

Spindle attendance includes all other duties previously listed except replacing supply packages. The time element for replacing supply is 0.547 min. This time element was established over hundreds of hours of observations on at least four different kinds of creels.

From these figures, it is simple to figure productivity of the operator. At 0.547 min. for each package, an operator will put up 44 packages an hour. If the package is 2, 3, or 4 lbs., that will be your answer to productivity.

If this breakdown of duties does not suit and your operator only replaces packages, with someone else handling the broken ends, etc., here's what an operator will do in 8 hrs. with packages of various sizes:

Replacing supply packages	51 (mins.)
Fatigue time	9

51 ÷ 0.547 = 93 packages per hour
93 × 8 = 744 packages per 8 hrs.

Now arithmetic tells the tale of production: 744 × 1 lb.; 744 × 2 lb; 744 × 3 lbs.; etc.

Effect of Twist on Spun-Rayon Yarns

The data for this chart are the result of tests by Frank Holden, a full account of which appeared in TEXTILE WORLD.

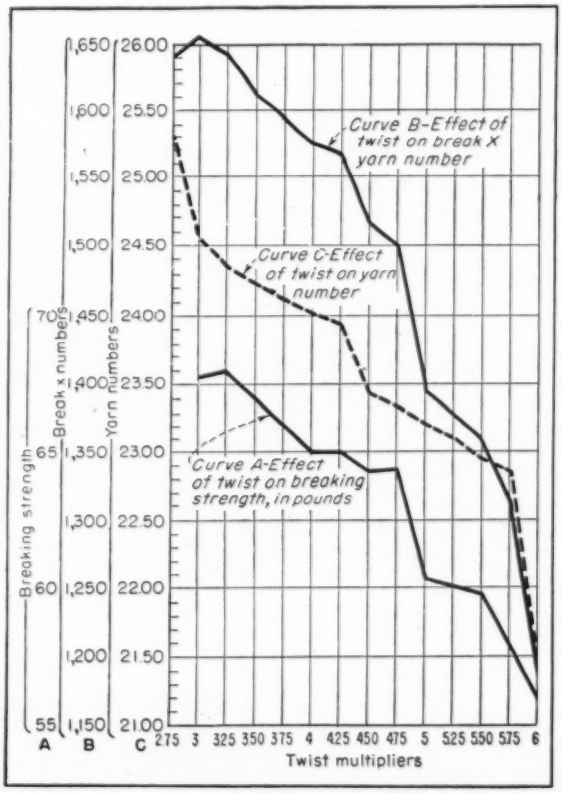
The chart shows the effect of twist on the qualities of a 24s yarn spun from 1½-in., 1.5-den., cut-viscose-rayon fiber, specially made for spinning on the cotton-yarn system.

While the chart represents only one series of tests, it is typical. The maximum strength is obtained with the lowest twist multipliers used, and a smooth curve down through Plot A or Plot B is much like that for cotton yarns twisted beyond the point of maximum strength.

If the contraction plot, C, is considered a straight line, as seems likely, it will be found that it follows very closely the contraction for singles cotton yarns.

The following table shows the important details of the organization used:

Waste opener	—
Double opener—porcupine and two blades	16 oz.
Finisher	—
Card—regular settings, slow flats	60 grs.
Drawing—two operations, bone guides, 320 rpm., 1⅝, 1¾, 1⅞ settings	60 grs.
Slubber—.65 tpi., 1⅜, 1¾ settings	75 hk.
Intermediate—.707 tpi. (as slubber)	2.20 hk.
Spinning—double roving, lightweight, leather over wood middle roll	24s



SLASHING

Checklist for Slashers

By JOHN E. ALLEN, in TEXTILE WORLD

With the many automatic controls on slashers, it's easy to forget the mechanical condition of the basic machine and just let it run. But maintenance of machine parts is just as necessary as with old slashers.

For example, yarn beams for the loom require the same care as always. Beams with loose heads; lost nuts, bolts, and rods; and bent arbors make high and low selvages that cause excessive yarn breakage at looms. And beams with rough barrels and heads and dirty heads inside result in excessive yarn waste at looms.

Many other worn and defective slasher parts and motions shown in the following checklist cause yarn damage. Here is the trouble they cause.

Worn bearings
Uneven tension on the beamed yarn
Stretched yarn

Loose, Dirty Drive Belts
Belt slippage and lost production

Badly Covered Calender Roll
Uneven pull on the sheet of yarn

Bent Comb Dents
High and low places on the beamed yarn

Misaligned Creels
Uneven pull on the yarn from section beams
Stretched yarn
Excessive waste

Defective Yardage Counters
Variation in the length of cuts on loom beams

Misaligned Cylinders
More power is required to drive cylinders

Leaking Cylinders
Lost steam
General dirty conditions

Dirty, Oily, Worn Frictions
Stretched yarn
Yarn elasticity is lost

Worn Head-End Gears
Yarn may be stretched

Hoods Dirty Inside
Condensation drips dirty water on the yarn

Immersion Rolls Not Level
Uneven size pickup

Immersion-Roll Bearing Worn
Uneven size pickup
Dirty yarn

Grooved Lease Rods
Chafed yarn

Bent Lease Rods
Unevenly built warps

Wrong-Length Pressure Roll
High and low selvages
Cut yarn

Pressure Roll Not Level
Unevenly built warps

Rough Pressure Roll
Cut yarn

Size Boxes Not Level
Variation in size pickup

Leaking Size Boxes
Loss of size
Dirty conditions

Worn Size-Kettle Bearings
Kettle breaks down

Size-Kettle Cover off
Excessive steam is needed to cook size

Leaking Size Pump
Loss of size
Dirty conditions

Worn Gears in Size Pump
Uneven pumping of size

Worn Squeeze-Roll Covers
Uneven size pickup

Rough Edges on Squeeze Rolls
Size is wasted
Dirty conditions

Squeeze Rolls out of Plumb
Size does not penetrate yarn

Leaking Valves
Loss of steam
If open coils are used in the size box, size is thin
Poorly sized warps

Slasher Drying Rates

Type of slasher	Contact length (ft.)	Thread length (ft.)	Steam pressure (Psi.)	Drying rate (lbs. per hr.)
Two cylinders (one 7-ft. and one 5-ft.) without rolls	25.8	52.0	12	315
Two cylinders (one 7-ft. and one 5-ft.) with rolls	31.4	67.5	12	375
Three cylinders (one 7-ft. and two 5-ft.)	44.0	70.0	12	485
Three cylinders (two 7-ft. and one 5-ft.)	53.0	86.5	12	620
Multiple cylinders (nine 30-in.)	44.8	60.3	35	1,200
Multiple cylinders (11 30-in.)	55.5	73.8	35	1,550
Four cylinders (Four 5-ft.)	53	100.0	22	1,000
Air-Dri Three 10,000-cu-ft.-per-min. fans Steam coil	48.0	54.5	125	1,000
Air-Dri Two 10,000-cu-ft.-per-min. fans Steam coil	32.0	38.5	125	750

MANUFACTURING

Slashing Filament Yarns

From TEXTILE WORLD

The following size formula and cylinder temperatures result in well-slashed synthetic filament yarns of various types. With this setup, delicate yarns are protected.

A 100-gal. mix for a warp consists of 58 lbs. of Evalan, 12 lbs. of Colloids 216, and 6 lbs. of ammonia. The temperature of the size box on this formula is 120° F. The slasher cylinders are not covered with cloth. However, on a gelatin mix, the first three slasher cylinders are covered with cheesecloth.

Both slashers should have identical single quetsches. The bottom roll is stainless steel; the top roll is rubber-covered.

The cylinder temperatures on the nine-cylinder slasher beginning at the size box are No. 1 100° F., No. 2 170° F., No. 3 185° F., No. 4 190° F., No. 5 200° F., No. 6 180° F., No. 7 170° F., No. 8 170° F., and No. 9 100° F.

Overwaxing Cotton Warps

Here are reports from five mills showing the results they are getting from overwaxing cotton warps:

Mill A—"The wax applicator is placed between the guide roll and the first split rod at the slasher. We use the same formula used before we started using wax.

"The wax is applied at 200° F. at ½ to 1% by weight. We have difficulty in keeping the wax at a constant temperature, and we have also had trouble with the pipe stopping up between the wax container and the roller trough.

"The diameter of our applicator roll is 4 ins., and it turns at 2 to 3 ft. per min.

"Direct results of the added wax are: (1) Some of the harshness is taken out of the warp to make the yarn smoother and more pliable and flexible; (2) it also lubricates the heddles, reed, and shuttle; and (3) weave-room efficiency is higher."

Mill B—"Our wax applicator is at the front of the slasher just back of the first split rod. There's no variation in our size formula when warps are overwaxed.

"Wax is kept at 180° F., and we vary the roller speed to get the right wax pickup.

"Since we started overwaxing, our seconds have decreased 1.5% and our production has increased 0.8%. Other advantages are: (1) less shedding at the loom, (2) desize tests show 1.3% more size and wax on the warp yarn after the cloth is woven, and (3) we also have a decrease of 29% in warp breaks per loom hour."

Mill C—"Our overwaxing roll is between the measuring roll and the big split rod. We use our standard size formula. We hold the wax at 180° F. and add 0.4% wax by yarn weight to the slashed yarn.

"A recent test showed that stops from sizing trouble were reduced from 0.504 per loom hour to 0.298 when warps are overwaxed. This test was performed on 60x48 cloth with 14s warp and 11s filling. We are still in the experimental stage in overwaxing."

Mill D—"We run our wax applicator roll before the split rod and use our standard size formula. The results of overwaxing are not conclusive because we're still in the experimental stage."

Mill E—"We have been applying hot wax to dried warps at the front of the slasher between the back measuring roll and the lease rods for several months.

"We have changed our warp formula to prevent piling up of top beams on terry warps.

"We keep the wax at 180° F. and add approximately 0.01% wax to the slashed warps. The roller makes about 1 rpm., and the speed depends on the speed of the slasher.

"We have experimented with wax on flat-woven goods a little, but most of our experience has been on terry towels. On this material, we have fewer broken warp ends in weaving and better weave-room efficiency. There is less shedding and end breakage at the slasher."

WEAVING

Good and Bad Practices for Batteryhands

By WILMER C. WESTBROOK, in TEXTILE WORLD

Correct posture has much to do with good job performance for batteryhands. To fill batteries correctly, the batteryhand stands erect with her weight evenly distributed on both feet. She faces the battery in a position about in line with the small end-disk bobbin holder.

The bobbin container (apron pocket, loom box, pinboard, or battery-filler truck) is located so that the bobbins are reached easily with a minimum of movement.

Good and Bad Practices

To plug the bobbins correctly, the batteryhand:

1. Picks up the bobbins with her left hand
2. Unwinds the yarn end with the right hand
3. Places the bobbin in the battery with the left hand
4. Places the yarn end in the thread guide and winds it around the thread holder with the right hand

There is a certain rhythm to these movements that can be acquired with practice.

A batteryhand who cannot run a job properly usually has one or more of the following faults:

1. She stands too far from the bobbin supply and either leans her body, stretches her arms, or takes a step to pick up the bobbins.
2. She stands too far to the side of the battery and has to lean over or take a step each time she places a bobbin in the battery or winds the yarn around the thread holder.
3. She stands with her weight on one foot. Usually this practice is done with a rocking motion with all the weight on the left foot while she picks up the bobbin; and then she shifts her weight to the right foot while she places the yarn on the thread guide and winds it around the thread holder.
4. She changes the bobbin from hand to hand several times while she removes the end of thread and places the bobbin in the battery. A good batteryhand can handle the bobbin and make other necessary movements easily with either hand.

All four faults involve unnecessary movements, take up time, and prevent maximum efficiency. But more important, the unnecessary movements are very tiring; and a tired worker is an unsafe, inefficient, and dissatisfied worker. All such bad work habits should be corrected.

Setting Batteryhand Jobloads

Two common methods determine how many batteries make a standard jobload for batteryhands:

1. One method uses the yards of yarn on an average bobbin, the width of the cloth, and the speed of the loom.

2. The other method is also based on the running time of an average bobbin and is found by timing it in the loom with a stop watch.

To find the running time of a bobbin of filling when the weight and yarn number are known, use these formulas:

$$840 \times \text{wt. (in lbs.)} \times \text{yarn no.} = \text{yds.}$$

An average 8¾-in. bobbin contains 0.120 lb. of yarn; so for 10s yarn, the formula is:

$$840 \times 0.120 \times 10 = 1{,}008 \text{ yds.}$$

Known Yardage Makes the Job Easy

This formula isn't necessary if the spinning frame or filling winder puts a uniform known yardage on every bobbin.

If the batteryhand workload is 500 bobbins per hour and the yardage per bobbin is known, the formula is:

$$\frac{\text{Yds. per bobbin} \times 36 \text{ (ins. per yd.)} \times 500}{\text{Ppm.} \times \text{cloth width} \times 60 \text{ (mins.)}}$$

Example:

$$\frac{1{,}000 \times 36 \times 500}{160 \times 44 \times 60} = 42.6$$

The batteryhand jobload is 43 batteries.

To figure the jobload with a stop watch, time four bobbins in a loom that is running at standard speed. Take an average of four bobbins to level out any variation in the yardage per bobbin.

As in the previous example, if yardage counters are used and all bobbins are uniform, it isn't necessary to get an average figure.

A constant is developed by dividing the standard workload by 60 (mins. in 1 hr.), and then the actual running time of the bobbin is multiplied by the constant to obtain the batteries per job.

A Constant Is Used

For a standard workload of 500 bobbins per hour, the constant is 8.33. If a bobbin of the 10s filling runs 5.13 mins., the batteryhand jobload is:

$$8.33 \times 5.13 = 42.7$$

The batteryhand jobload for this number of fillings is 43 batteries.

There are many instances where a batteryhand has two or more numbers of filling on the job. One way to figure a full job is to use percentages. If the job has 23 batteries of one style where 40 batteries are a full job, the batteryhand has 57.5% of a full job on this style.

If, for instance, the adjoining looms have a style that has 60 batteries per job, the batteryhand needs 42.5% of 60, or 25 of these batteries, to fill out the job.

Another way to lay out mixed jobs is to have a constant for each unit. Each battery on a 40-battery job represents 2.5% of the job; so 2.5 is the constant for this filling. If there are 23 batteries of this particular style on a job, then $23 \times 2.5 = 57.5\%$ of a job; and enough units of one or more other styles can be added to make a full 100% job.

In most mills, there is a lot of variation in the number of yards per bobbin. This variation may be caused by the way the doffing cycle is laid out, by a difference in the build of the package, or by the density of the lay of the yarn.

Batteryhand jobloads can be laid out more precisely and fairly and labor cost can be cut if each filling bobbin contains a uniform predetermined number of yards of yarn.

Increase the Life of Loom Pickers

Drop-box pickers are often the greatest single-item loom-repair cost for S-5, S-6, C-4, C-5, C-6, and W-3 looms. But this cost can be reduced more than 50% by selecting the correct picker, inspecting all pickers three times a week, and keeping pickers adjusted and parallel.

The true flight of a shuttle across the race plate of a loom depends to a great extent on the condition of the pickers. Although loop pickers for the drive end of many Crompton & Knowles looms perform the same general function of drop-box pickers on the head end of the looms, drop-box pickers have to be given more attention.

With correct maintenance, picker cost can be cut more than 50% in most weave rooms. In addition, proper maintenance reduces loom downtime and second-quality cloth. Production can also be increased because loomfixers stop looms for maintenance only when all other looms are running.

Selecting the proper picker for your looms is the first and most important step you can take to make your pickers last longer. A change in shuttle size often demands a change in picker size.

A special rule to measure the correct length of a picker between the shuttle-spur point and the center of the picker rod is furnished by one of the major picker manufacturers.

Paralleling Is Most Important

The way drop-box pickers are paralleled is more important than the physical condition of the picker. For instance, a picker worn beyond its useful life will usually throw a more-accurate shuttle than a new picker out of parallel.

However, a proper picker-inspection schedule, as shown in the checklist on p. 44, can eliminate the weaving hazards from both picker defects. Have your loomfixers inspect all pickers on all looms three times each week.

This inspection schedule doesn't require much time because a section of looms can be divided into three parts with a loomfixer on each of the three shifts inspecting one-third of the looms. For example, have a loomfixer on a section of 50 S-6 looms inspect 16 or 17 looms.

Foremen Must Check Pickers

Then have your weave-room foreman, second hand, or assistant overseer spot-check a few looms at random on his job each day to be sure loomfixers are inspecting and repairing their defective pickers.

This series of picker inspections along with complete inspections of looms at warp-outs will result in keeping pickers in excellent condition all the time.

To inspect a picker properly, stop the loom with the shuttle in the head end with the top cell of the shuttle box level with the race plate:

1. Pull the shuttle to the front of the shuttle box, and check the size of the shuttle-spur hole in the picker. If the hole covers three-fourths of the area of the spur, put on a new picker.

2. Hold the head of the picker, and move the picker on the picker rod. During the movement, inspect the hole in the picker barrel for excessive wear. If there's more than $\frac{1}{8}$ in. play between the picker and the rod, replace the picker.

Pickers Wear at Heads and Barrels

Most pickers are discarded for wear at the heads and barrels.

Excessive wear indicated by too deep a hole in the head while the barrel is still in good condition is usually caused by too much picker-stick power or poor checking by the checkstraps.

Too much tension on the return spring or the picker-stick spring also wears the hole in the picker head rapidly.

Wear at the barrel is caused by (1) a rough or worn picker rod or (2) too much tension on the binders.

Shuttle boxes out of adjustment or out of time ruin many pickers before they wear out normally. A groove extending vertically in the face of the picker head indicates (1) the shuttle boxes are out of time or (2) the binders are too tight.

Many pickers are discarded because they aren't paralleled properly. The shuttle spur may hit too near the top, bottom, inside, or outside edge. Then the picker has to be removed prematurely because it throws a bad shuttle or makes filling jerk-backs.

For a picker to be perfectly parallel, the shuttle spur must hit in the exact center of the picker head with the picker at the outside end of the lay end. Then the picker must raise the shuttle $\frac{1}{32}$ to $\frac{2}{32}$ in. when the picker is at the forward end of the picker-stick stroke.

Other causes of picker wear are:

1. Not enough picker-rod strap. The picker travels farther forward than is necessary and wears in the barrel. The picker also returns to its idle position slowly and is roughened or broken by a hanging shuttle box.

2. A hard-packed picker-rod strap. The hard blow of the picker against the hard strap wears the picker where it contacts the picker stick.

3. Worn lay-end bumper. The picker is too far away from the shuttle spur, which results in a hanging shuttle box. The shuttle pounds the picker against the lay end and batters the back of the head or wears the hole in the picker head quickly.

4. Badly worn picker stick, which results in wear from the power stroke. Fabric-rubber pickers are very hard on hardwood picker sticks. At high loom speed, the sticks last only a few days. When a new picker is put on a loom with a worn picker stick, the stick cuts the new picker and ruins it quickly.

To keep sticks from wearing rapidly, you have two choices: (1) use laminated picker sticks, or (2) glue a strip of fibre on the front of the picker stick where it contacts the picker.

Many mills do not turn reversible drop-box pickers when the hole is worn on one side. But if the picker is in good condition, it can be turned and will often last as long on the second side as on the first.

However, don't turn the picker if (1) the barrel is worn egg-shaped, (2) the surface that contacts the picker stick is cut, or (3) the hole in the head has worn into the edge so that filling jerk-backs will be made.

Loomfixers must use good judgment in appraising pickers to be turned.

On weaves where picker failures make a major cloth defect, have your foreman decide when a picker can be turned.

Another question that controls the life of a picker must be answered by each mill—"Should I lubricate or not lubricate picker rods?"

Loomfixers' Checklist

Check Pickers Monday, Wednesday, and Friday

Check Picker Head

1. Hole too large
2. Hole out of center
3. Rough places
4. Grooved vertically

Check Picker Barrel

1. Worn more than 1/16 in. on rod

Check Picker at Stick Position

1. Cut by stick

Check Picker For Parallel

1. Back
2. Front

Check Picker Rod

1. Rough places
2. Worn
3. Bent

Check Picker-rod Strap

1. Hard-packed
2. Lively
3. Binding picker

Check Picker Stick

1. Cutting picker
2. Grooved

Generally picker barrels will last longer if they are lubricated. But lubrication has two definite disadvantages:

1. Shuttle boxes often hang immediately after the picker rods are lubricated.

2. The picking stroke frequently throws the lubricant on the warp yarns or on the woven fabric, and second-quality fabric is made.

Newer lubricants manufactured especially for picker rods or the newer synthetic-base lubricants may be the answer to the lubrication problem.

Loom Maintenance Program

Follow-up inspections are necessary for best results from a preventive-maintenance program. Regular inspections and written reports help too. Here are ways several mills improve loom performance:

One mill has preventive-maintenance work done at warp-outs. The loomfixer checks the loom thoroughly for worn parts. He also checks all loom settings and corrects any settings that need it. The foreman makes a follow-up check on each loom and uses a chart that shows the parts that should be checked.

The charts are passed on to the overseer each day. The overseer and the assistant superintendent spot-check three looms every week.

Another mill has each loomfixer responsible for the maintenance of certain looms on his section. The loomfixer thoroughly checks one loom per day. He uses a printed loom-inspection form for a guide.

When the loomfixer completes any necessary repairs or adjustments disclosed by the check-up, he signs the form and turns it in at the weave-room office. The foreman on the following shift inspects the loom and makes a notation on the form of anything that he finds wrong with the loom.

If a form is returned for rechecking, the loomfixer makes the suggested repairs or adjustments and the foreman inspects the loom again to be sure that it has been fixed as recommended. The overseer makes spot checks of the looms after repairs are completed.

Periodic loom inspections are made by one mill. The looms are divided by sections with each loomfixer responsible for any faulty parts of the looms on his section.

Each loomfixer is required to go over one loom per week, and he uses a special check sheet as a guide. All looms are overhauled once a year, and a record is kept of maintenance work performed.

One Man Inspects All Looms

One mill reported that it has a specially trained man who makes an inspection of each loom every three months. To simplify reports, each loom is divided into 10 motions. Each motion is inspected and graded as to its operating condition. Grades are very good, good, standard, below standard, and poor.

When a motion is graded below standard or poor, the report specifies whether the low grade is caused by bad settings or by worn parts. When the inspection of a loomfixer's job is complete, a report is made in duplicate showing the condition of each motion on the loom. One copy of the report is given to the loomfixer, and the other copy is filed in the weave-room office.

If the number of defective motions on a loomfixer's job is low, no immediate follow-up is made. But if there are a number of defective motions, the report is discussed with the loomfixer. After about three weeks, the job is again inspected to see if the defective motions have been fixed.

Second Hand Checks Up

Each loomfixer thoroughly checks five looms per week, and a follow-up check is made by the second hand. Each loomfixer inspects shuttles and shuttle boxes on a given day each week. The second hand follows up to see that this work is done.

At one mill, all loomfixers are taught to fix the looms in the same manner. Loom manuals are used to show the correct method for each part. Periodically, each loom is checked and actual settings of the parts are compared with the standard settings.

Another mill has its loomfixers go over two looms per week and perform a definite program of maintenance. There are 36 looms per section, and each loom is checked once every six weeks. The looms are rechecked by the supervisor.

Looms Checked at Shift Change

The looms are checked by the loomfixers immediately after shift change in one mill. They see that shuttles are boxing correctly and that warp tension is correct. They make any adjustments that are needed to the thread cutters and see that the filling forks are operating correctly. The quill cans are checked for big pieces or skinned quills.

The loomfixer dresses one-third of the shuttles on his section each day. He also gives one loom a complete check-up each day. Once a week each shuttle is sanded and polished, spring and eye tightened, and fur and bristle serviced.

The shift overseers in another mill inspect three looms per week on each loomfixer's section. They use a check sheet that covers each loom motion.

Any loom that needs repairs is checked again after the repairs have been made. A complete check-up of a loom is made when a new shuttle is put in. A complete inspection cycle is made of all looms every four months.

Courtesy Alabama Textile Operating Executives

Predetermine Yards of Woven Cloth

A formula for production in yards of cloth woven per 120 hrs. is:

1. 100% constant—ppm. x 7,200 (mins. in 120 hrs.) x 36 (ins. per yd.)

2. Coefficient — 100% constant — 1 + ppi. × expected operating efficiency.

To find the yards of cloth that will be woven from a loom in a 120-hr. work week, follow this example (shown in parentheses on the tables):

Style No. 464 has 64 ppi.; it's woven on 72-in. Draper L-model looms running at 113 ppm.; the average efficiency for this style of cloth is 90%.

1. Go down the Efficiency % column to 90.

2. Move to Picks-per-Inch column to 64.

3. Enter 0.014063 from Picks-per-Inch column into the keyboard of a calculator.

4. Go down the Picks-per-Minute column to 113 and use the adjacent number 22600.

5. Multiply the number in the keyboard by 22600, and mark off six decimal points.

Picks per inch

Efficiency %	39	42	56	63	(64)	72	92	108
100	.025641	.023810	.017857	.015873	.015625	.013889	.010870	.009259
99	.025385	.023572	.017678	.015873	.015469	.013750	.010761	.009166
98	.025128	.023334	.017500	.015467	.015313	.013611	.010653	.009074
97	.024872	.023096	.017321	.015310	.015156	.013472	.010544	.008981
96	.024615	.022858	.017143	.015152	.015000	.013333	.010435	.008889
95	.024359	.022620	.016964	.014994	.014844	.013195	.010327	.008796
94	.024103	.022381	.016786	.014836	.014688	.013056	.010218	.008703
93	.023846	.022143	.016607	.014678	.014531	.012917	.010109	.008611
92	.023590	.021905	.016429	.014520	.014375	.012778	.010000	.008518
91	.023333	.021667	.016250	.014363	.014219	.012639	.009892	.008426
(90)	.023077	.021429	.016071	.014205	(.014063)	.012500	.009783	.008333
89	.022820	.021191	.015893	.014047	.013906	.012361	.009674	.008241
88	.022564	.020953	.015714	.013889	.013750	.012222	.009566	.008148
87	.022308	.020715	.015536	.013731	.013594	.012083	.009457	.008055
86	.022051	.020477	.015357	.013573	.013438	.011945	.009348	.007963
85	.021795	.020239	.015178	.013492	.013281	.011806	.009240	.007870

Picks per minute

Ppm.	100% Constant	Ppm.	100% Constant	Ppm.	100% Constant	Ppm.	100% Constant	Ppm.	100% Constant	Ppm.	100% Constant
88	17600	128	25600	141	28200	154	30800	166	33200	178	35600
92	18400	129	25800	142	28400	155	31000	167	33400	179	35800
99	19800	130	26000	143	28600	156	31200	168	33600	180	36000
106	21200	131	26200	144	28800	157	31400	169	33800	181	36200
(113)	(22600)	132	26400	145	29000	158	31600	170	34000	182	36400
120	24000	133	26600	146	29200	159	31800	171	34200	183	36600
121	24200	134	26800	147	29400	160	32000	172	34400	184	36800
122	24400	135	27000	148	29600	161	32200	173	34600	185	37000
123	24600	136	27200	149	29800	162	32400	174	34800	186	37200
124	24800	137	27400	150	30000	163	32600	175	35000	187	37400
125	25000	138	27600	151	30200	164	32800	176	35200	188	37600
126	25200	139	27800	152	30400	165	33000	177	35400	189	37800

Calculating Cloth Weights

By JOHN DUERST, in TEXTILE WORLD

When the density and size of yarn are known, cloth weights with little deviation from data in handbooks can be figured. The formula to find the weight in grains of a 1-in. square of cloth is:

$$0.23\left[B\times(E-1)\frac{P}{N_f}+B^1\times(P-1)\frac{E}{N_w}\right]$$

Where

P = No. of filling ends per inch
E = No. of warp ends per inch

$$B=\sqrt{\left(\frac{1}{E-1}\right)^2+0.0003^2(U_w+U_f)^2}$$

$$U_w=\sqrt{1+20{,}000/N_wF}-1$$
$$U_f=\sqrt{1+20{,}000/N_fF}-1$$

$$B^1=\sqrt{\left(\frac{1}{P+1}\right)^2+0.0003^2(U_w+U_f)^2}$$

N_f = Filling yarn number
N_w = Warp yarn number

B is the filling pattern length obtained from the repeated pattern shown in the diagram.

$$B=\sqrt{\left(\frac{1}{E-1}\right)^2+\left(\frac{D_w+D_f}{2}\right)^2}$$

B^1 is the warp pattern length

$$B^1=\sqrt{\left(\frac{1}{P-1}\right)^2+\left(\frac{D_w+D_f}{2}\right)^2}$$

The pattern length or crimp length B repeats itself $E-1$ times per inch. The length B^1 is repeated $P-1$ times per inch.

Therefore the weight in grains of filling in 1 sq. in. of cloth =

$$B\times(E-1)P\times\frac{7{,}000}{30{,}240\times N_f}$$

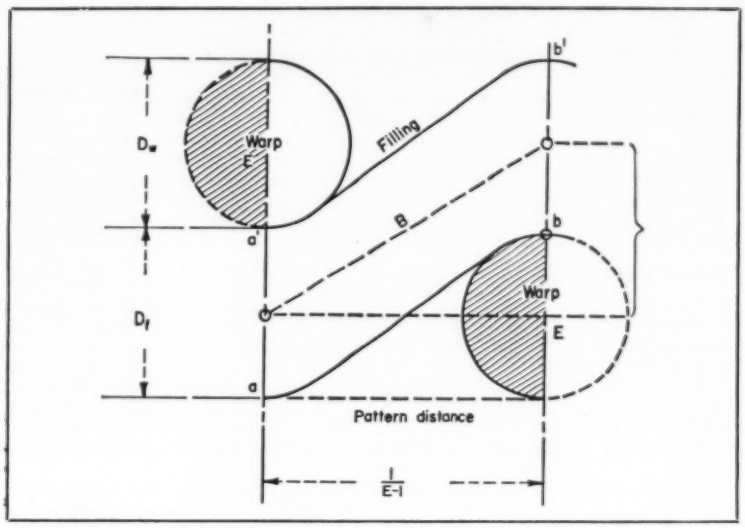
The weight in grains of warp in 1 sq. in. of cloth =

$$B^1\times(P-1)E\times\frac{7{,}000}{30{,}240\times N_w}$$

Yarn diameters are functions of fiber diameters, and the number of fibers per yarn diameter are difficult to measure. These diameters can be expressed in terms of yarn numbers and fiber weight or Micronaire (F), and this is done with Duerst's fiber-pattern formula $D_w = du_w$.

Where d = Fiber diameter, which averages about 0.0006 in.

$$U_w=\sqrt{1+20{,}000/N_wF}-1$$
$$D_w=0.0006u_w$$
$$U_f=\sqrt{1+20{,}000/N_fF}-1$$
$$D_f=0.0006uf$$



Service Life of Shuttles on Looms Weaving Industrial Fabrics

Loom model	Ppm.	Loom hours
32-in. E	172	2,688
32-in. X	172	1,584
40-in. E	163	1,828
44-in. E	160	2,163
46-in. X-2	182	2,830
54-in. XP	144	1,863
60-in. X-2	160	1,138
64-in. XP	145	1,102
66-in. XP	131	2,666

Supply Cost per 1,000 Loom Hours for Heavy Fabrics

Loom	Ppm.	Fabric	Cost
32-in. E	172	Duck	$7.30
32-in. X	172	Duck	8.30
40-in. E	163	Duck	11.30
44-in. E	160	Drill, twill	11.30
46-in. X-2	182	Moleskin	8.15
54-in. XP	144	Duck	11.00
60-in. X-2	160	Drill, sheeting	11.40
64-in. XP	145	Enamelling duck	13.70
66-in. XP	131	Duck	16.90

Average Life of Loom Parts

Here are the results of a survey of three mills showing the average life in hours of five main loom supply parts on X-2 looms.

Mill No. 1—The average life of loom parts on X-2 looms running at 180 ppm. are: (1) shuttles, 4,575; (2) checkstraps, 912; (3) pickers, 602; (4) picker sticks, 1,816; and (5) lug straps, 15,000.

At this mill, the total supply cost per loom per 1,000 loom hours is $19.07.

Mill No. 2—The life of supplies in loom hours on 40-in. X-2 looms running 194 ppm. on 64-sley coarse cotton cloth are: (1) shuttles (fibre-clad), 7,025; (2) checkstraps (endless), 4,906; (3) pickers, 245; (4) picker sticks, 1,088; and (5) lug straps (fabricated rubber), 4,613.

The supply cost per loom at this mill for 1,000 loom hours is $11.44.

Mill No. 3—The life of supplies in loom hours on 42-in. looms running at 196.5 ppm. is: (1) shuttles (dogwood), 2,500; (2) checkstraps, 2,200; (3) pickers, 982; (4) picker sticks (hickory), 3,500; and (5) lug straps, 14,000.

The over-all supply cost per loom for 1,000 loom hours is $18.52 at this mill.

Stop Cloth From Telescoping

Here are several tips to stop telescoping of cloth at the cloth roller of looms as the cloth builds up:

1. Start the end of the cloth correctly at the beginning of the roll. Set the roll tension heavy on the empty roll. Have loomfixers check the cloth-roll spring and racks periodically to be sure they are operating efficiently.

2. Use collars on the cloth rods, keep cloth-rod bearings level, and maintain even tension on the ends of the rods.

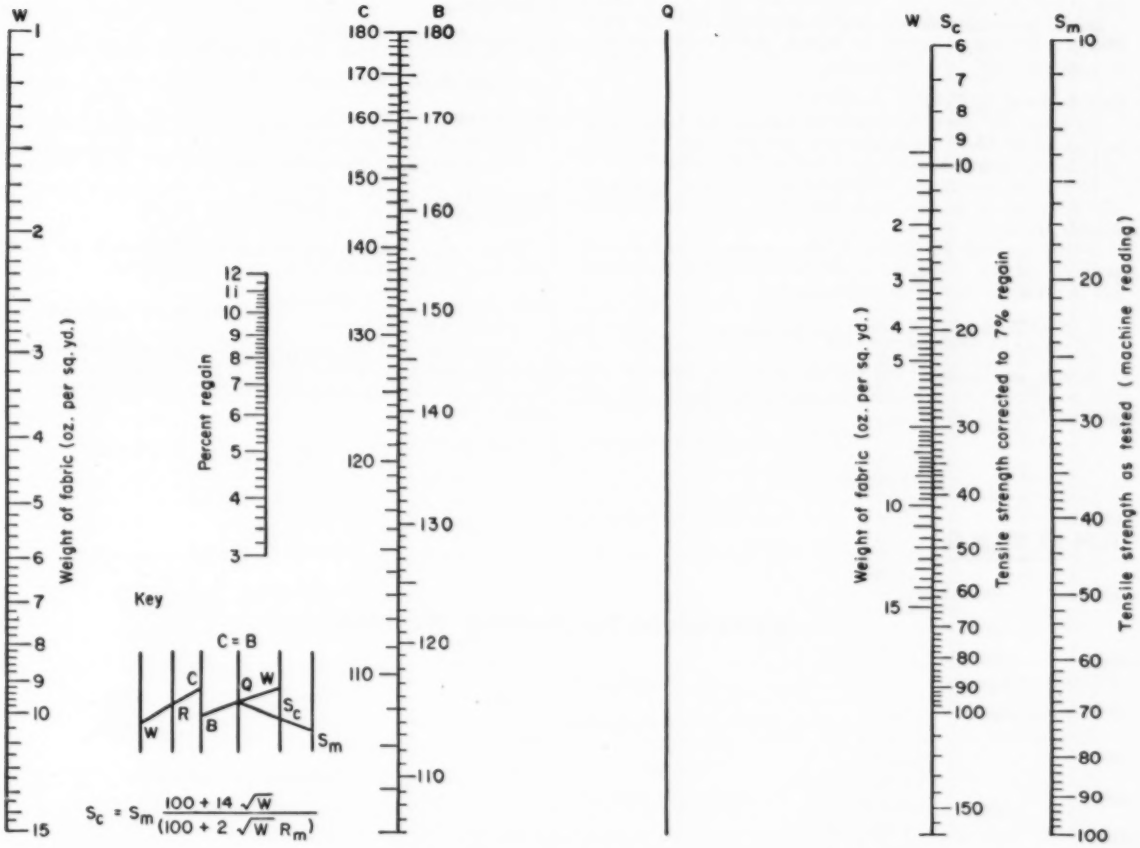
3. Use square cloth rods inside wooden shells the full length of the cloth-rod space. Wooden keys fasten the cloth to the wooden shells.

4. Use a 3-in.-dia. wooden tube over the cloth-roll rod. Attach a metal washer to each end of the tube. There's just enough clearance at the end of the washers to allow them to miss the cloth-roll stand.

The main causes of telescoping cloth are:

1. Cloth not started right on the cloth roll
2. Weak cloth-roll springs
3. One end of the cloth roll going up ahead of the other
4. Broken teeth in the spring-shaft gear or cloth-roll rack
5. Spring shaft bent or binding
6. Worn cloth-roll block
7. Badly worn fillet on the take-up roll
8. Take-up roll not level
9. Slack-woven cloth
10. Bent or sprung cloth roll.

To Correct Fabric Strength to 7% Regain



It is often necessary to make routine strength tests without waiting for the laboratory to come to the proper conditions.

The accompanying nomograph has been constructed to facilitate the correction of strengths to 7% regain. It is a simplification of a nomograph by Professor Schwartz. Since all corrections have been made to 7%, it has been possible to dispense with several scales. The range of variables has been adjusted to give scales easy to read over the range of conditions ordinarily encountered in testing light- and medium-weight fabrics. To compare the strengths of two fabrics tested under different conditions, it is only necessary to correct both to 7%.

As an example, take a 2.15-oz. fabric having a breaking strength of 34.6 lbs. at 5.7% regain:

1. The fabric weight, 2.15 oz., is located on the left-hand scale, and a line is drawn through the per cent regain, 5.7%, to the C scale, where a value of 116.5 is obtained.

2. This value, 116.5, is then located on the B scale and joined again with the second fabric weight scale at 2.15 oz. The intersection of this line with the Q scale is marked.

3. A line is drawn connecting this turning point on the Q scale with the breaking strength, 34.6 lbs. on scale S_m. The corrected strength, 35.2 lbs., is read on the S_c scale.

MANUFACTURING

Formula for Makeup Pay for Loom Curtailment

When weavers are paid on a piece-rate basis, it is often necessary to give them makeup pay for unavoidable loom stoppage. Since the piece rates are based on hourly rates, the only factor needed for makeup pay is the number of job hours lost.

Here is a simple formula for figuring the weaver makeup pay:

$$\frac{\text{Looms stopped} \times \text{hours stopped}}{\text{Number of looms on job}} = \text{hours lost}$$

Example: A weaver has six looms idle for 4 hrs. because of an electrical shortage on a 30-loom job:

$$\frac{6 \times 4}{30} = 2/3 \text{ hr.}$$

The weaver is paid for ⅔ hr. at hourly base rates in addition to the piece-rate pay earned on the job.

Calculate Weaving Labor Cost

Weavers are usually paid on the basis of rate per 1,000 or 10,000 loom picks. In some plants, batteryhands are paid on the same basis. The pick rates are determined by the standards department based on the principles of other piece-work rates; that is, the production of the machines per assignment (in hanks or picks) per hour at a standard efficiency divided into the rate of pay per hour.

Several incentive plans are used to determine both the workload and the rate of pay to be earned. But all plans produce at a rate of 1,000 or 10,000 picks.

Cost Is Based on Picks

To figure the direct labor cost of weavers and batteryhands per pound of fabric, divide the pick rate per 1,000 or 10,000 picks by the pounds of cloth per 1,000 or 10,000 picks.

To find the pounds per 1,000 or 10,000 picks, you must know the picks per inch and either the yards per pound or the pounds per yard.

When the yards per pound or the pounds per yard are not available but the ounces per square yard are given, the pounds per yard may be figured the following way:

$$\frac{\text{oz. per sq. yd.} \times \text{width}}{\text{16 oz. per lb.} \times \text{36 ins. per yd.}} = \text{lbs. per yd.}$$

Assume, for example, that you are weaving a fabric of 1.75 yds. per lb. with 44 ppi. at a total weaver and batteryhand rate of $0.0126 per 1,000 picks.

How the Formula Works

Divide 1x1,000 by the pounds per yard x 36 ins. per yard to get the pounds per 1,000 picks. Divide the rate per 1,000 picks by the pounds per 1,000 picks to get the cost per pound. For a comparison of cost per yard, divide the cost per pound by the yards per pound.

Example:

$$\frac{1 \times 1{,}000 \text{ picks}}{\text{1.75 yds. per lb.} \times \text{44 ppi.} \times \text{36 ins. per yd.}}$$

$$= 0.360 \text{ lb. per 1,000 picks}$$

$$\frac{\$0.0126 \text{ rate per 1,000 picks}}{0.036 \text{ lbs. per 1,000 picks}} = \$0.350 \text{ D.L.C. per lb.}$$

Where: D.L.C. = direct labor cost

$$\frac{\$0.0350 \text{ D.L.C. per lb.}}{\text{1.75 yds. per lb.}} = \$0.0200 \text{ D.L.C. per yd.}$$

When the pounds per yard are available, the pounds per 1,000 picks may be determined by the following method:

$$\frac{0.571 \text{ lbs. per yd.} \times \text{1,000 picks}}{\text{44 ppi.} \times \text{36 ins. per yd.}} = 0.360 \text{ lbs. per 1,000 picks.}$$

The pounds per 1,000 picks are used for a production constant by accumulating the number of 1,000 picks recorded in a period for each style and applying the proper production constant to them.

KNITTING

Horsepower for Knitting Machines

Full-fashioned hosiery

Single section	¼ hp.
Four section	¾ or ½ hp. (two speed)
30 section	7½ hp. (variable-speed d.c.)
32 section	7½ hp. (variable-speed d.c.)

Full-fashioned outerwear

Four section	1¾ hp. (two speed)
Eight section	3 hp. (variable-speed a.c.)

Circular hosiery

52 P.W. machines	10 hp. (three phase)
60 women's seamless	15 hp.
48 Komet links machines	10 hp.
30 argyle	5 hp.

Tricot

168-in.	5 hp.

Raschel

Reiner	1½ hp.
Kidde Model C	1 hp.
Kidde Model E	2 hp.

Underwear (latch and spring needle)

Ribbers	½ hp.
9- to 14-in. cylinders	1 hp.
15- to 22-in. cylinders	1½ hp.
23 ins. and up	2 hp.

Underwear (Tompkins)

D-2 (per head)	¾ hp.
S-1	1 hp.

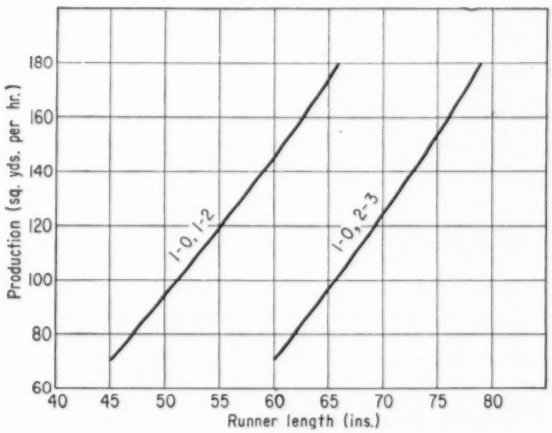
Outerwear

7- to 14-in. cylinders	¾ hp.
14- to 18-in. cylinders	1 hp.
19- to 26-in. cylinders	1½ hp.
27 ins. and up	2 hp.

Hosiery Sizes

Type	Age (years)	Shoe	Sock size
Infants'	½	1 to 1½	4½
	1 to 1½	2 to 3	5
	2 to 2½	4 to 5	5½
	3	5½ to 6	6
	3½	6½	6½
	4	7 to 8	7
Children's	4 to 4½	6 to 7	6
	4½ to 5	8 to 9	6½
	6 to 7	10 to 11	7
	8 to 9	12 to 13	7½
Misses'	10 to 11	1 to 2	8
	11 to 12	2½ to 3	8½
	12 to 13	4 to 4½	9
	13 to 14	5 to 6	9½
Boys'	8 to 9½	12 to 13	8
	10 to 11½	1 to 2	8½
	12 to 13	2½ to 3	9
	13½ to 14	3½ to 4½	9½
Men's		5 to 5½	9½
		6 to 6½	10
		7 to 8	10½
		8½ to 9	11
		9½ to 10	11½
		10½ to 11	12
		11½ to 12	13

Tricot Production



Tricot production in square yards can be checked readily against the accompanying diagram from Textile Machine Works. The diagram is intended for 168-in. machines running 800 courses per minute at 90% efficiency, but 400-course-per-minute production can be calculated by dividing the production figure by two.

Follow the runner length of the front or the back bar up from the bottom line and read the production at the left opposite to where the vertical line meets the coordinate.

For instance, if the front-bar runner length is 65½ ins., the production will be 100 sq. yds. per hr.

Selecting Yarns for Knitting

Modern knitting machines knit a wide range of yarn sizes; but machines are made with needles spaced from 2 to 60 needles per inch, and yarns of many sizes are required to obtain the best results. Too-heavy yarns produce fabrics with little elasticity. Too-fine yarns produce sleazy fabrics.

The following formulas will provide yarn numbers to give suitable results on most machines. Formulas are also given to figure the correct cut or gauge of machine for certain yarn numbers.

Plain jersey machines:

$$\text{Cotton yarn number} = \frac{\text{cut}^2}{18}$$

$$\text{Worsted yarn number} = \frac{\text{cut}^2}{12}$$

$$\text{Cut} = 4.5\sqrt{\text{cotton yarn number}} = 3.5\sqrt{\text{worsted yarn number}}$$

Circular rib machines:

$$\text{Cotton yarn number} = \frac{\text{cut}^2}{8}$$

$$\text{Worsted yarn number} = \frac{\text{cut}^2}{5}$$

$$\text{Cut} = 2.9\sqrt{\text{cotton yarn number}} = 1.9\sqrt{\text{worsted yarn number}}$$

Fixed-spring-needle machines:

$$\text{Cotton yarn number} = \frac{\text{gauge}^2}{43}$$

$$\text{Worsted yarn number} = \frac{\text{gauge}^2}{29}$$

$$\text{Denier} = 5315 \div \frac{\text{gauge}^2}{43}$$

$$\text{Gauge} = 6.5\sqrt{\text{cotton yarn number}} = 5.4\sqrt{\text{worsted yarn number}}$$

Full-fashioned outerwear machines:

$$\text{Worsted yarn number} = \frac{\text{gauge}^2}{47}$$

$$\text{Gauge} = 6.8\sqrt{\text{worsted yarn number}}$$

Flat latch-needle machines:

$$\text{Worsted yarn number} = \frac{\text{cut}^2}{9}$$

$$\text{Cut} = 3\sqrt{\text{worsted yarn number}}$$

Men's circular-hosiery machines:

$$\text{Cotton yarn number} = \frac{\left(\frac{\text{needles}}{\pi D}\right)^2}{18}$$

For example: 176×3½-in. machine:

$$\text{Cotton yarn number} = \frac{\left(\frac{176}{3.12 \times 3.5}\right)^2}{18} = \frac{16^2}{18} = 14\text{s or } 2/28\text{s}$$

$$\text{Worsted yarn number} = \frac{\left(\frac{\text{needles}}{\pi D}\right)^2}{12}$$

Note: See Yarn-Number Conversion Table [p. 18, 1957-1958 FACT FILE] to convert to other yarn numbers

Cleaning and Lubrication Chart For Latch-Needle Circular Machines

Time interval	Parts	Cleaner, lubricant, and function	Method
After each cloth roll has been removed	Needles, needle slots, latches and latch slots, sinkers and sinker slots	Compressed air and needle rust-preventive oil to remove cotton lint from parts and to lubricate them for short periods of time	With the machine in motion: (1) hold a long-nozzled air gun near the cylinder and blow up through the sinkers. (2) Blow off the top of the sinkers and sinker cam and feeder-carrier rings. (3) Blow down through the sinkers. Use needle oil in a compressed-air oil sprayer and direct a profuse oil mist from the sprayer at the needles and sinkers.
Each morning	Needles, needle slots, butts and latches, sinkers and sinkers slots	Compressed air, needle rust-preventive oil, and an adhesive oil to clean the previous day's accumulation of dirt and to lubricate the parts for the coming day	Blow all parts clean with compressed air as outlined above. Spray with needle oil as outlined above. Use 1/2 pint needle oil and flush the parts by pouring oil generously on the exposed parts of the sinkers while the machine is in motion. Aim the flow at the sinker-rest ring. Repeat the air cleaning to remove all foreign matter loosened by the previous operations. Apply an adhesive oil sparingly to the needle butts while the machine is in motion by permitting the oil to drip from an oil can down the left side of one stitch cam. While the machine is in motion, apply an adhesive oil to the sinker butts and the sinker cams through the two countersunk oil holes in the top of the sinker-cam ring. Apply an adhesive oil sparingly between the exposed portions of the sinkers and the sinker cam ring.
Daily	Drive-shaft bearing Cylinder-gear ring Pinion-gear bearings	An adhesive oil to lubricate	Fill the oil cups on the top of the drive leg and drive-support bracket on the side of the outer ring and on the side of the legs near the insignia cover
Daily	Hub of large silent chain-sprocket wheel in drive shaft	Absorbed oil or grease to lubricate	Use a grease gun on the wheel hub to force the grease in
Daily	Motor	Compressed air to remove cotton lint from motor windings	Shut off the power from the disconnect switch, and direct a compressed-air stream through the opening in the motor frame to blow lint clear
Daily for the first week of machine use, weekly thereafter	Silent drive chain, take-up sprockets and chains, take-up rollers, take-up worm and worm gear, cloth spreader, hand-wheel drive, cloth take-up rollers, clutch disengaging linkage mechanism and gate safety slide	An adhesive oil to lubricate	Use oil can to lubricate appropriate bearings, oil holes, and oil cups
Semiannually	Motor and bearings in take-up table	Absorbed oil to lubricate	Use a grease gun on take-up table and motor

Note. When parts are cleaned with compressed air, they should be lubricated immediately after as the strong air blast removes lubricants as well as dirt and lint.

An adhesive oil should be used after the needle oil since the needle oil has a tendency to wash away the adhesive oil.

Observe if the oil level in the oil cups drops with machine use. If the levels don't drop, the oil cup and passage are clogged and should be cleaned.

Courtesy Supreme Knitting Machine Co., Inc.

Two Ways To Clean Knitting Machines

There are two common methods of cleaning knitting machines automatically in the U. S. One method uses a traveling cleaner, which cleans up to 30 machines. The second method uses compressed air with a blowing unit attached to each head of every machine.

The traveling cleaner usually rotates on a track hung from the ceiling. The track winds around the knitting room and is located so that it blows off each machine at intervals of 2 to 4 mins.

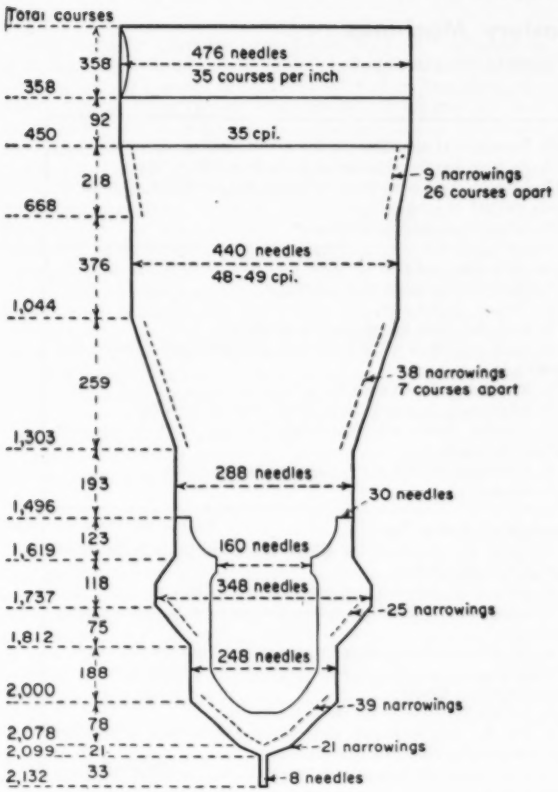
The air blast is created by a fan driven from an electric motor on the cleaner. The fan may rotate or it may have an air duct pointed at the ceiling to keep beams, girders, ceilings, and walls clean.

Individual cleaning systems require a compressor and lines to feed each machine. A 100-psi.-ga. compressor to deliver 55 to 60 cu. ft. of air per minute would be ample for 50 machines. Some mills prefer two smaller compressors for emergency sake, and some mills operate a timing device to blow the machines off at regular intervals and conserve air pressure.

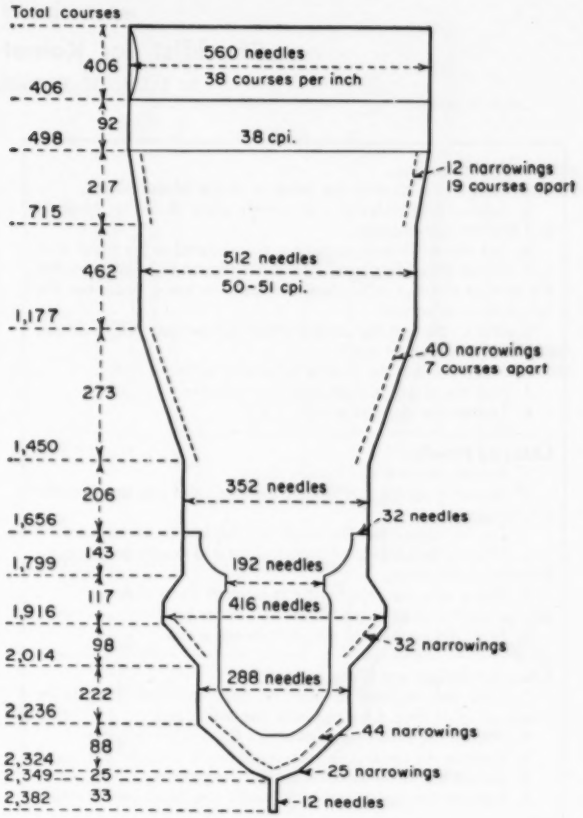
Compressed air enters a rotating valve on the top bracket of each head and is carried through a copper pipe down the take-up bracket arm. Small holes near the end of the pipe direct air to the needles and burrs.

Attempts have been made to clean machines by attaching a blade to the take-up bracket, but these experiments have not been successful to date.

Full-Fashioned-Stocking Construction

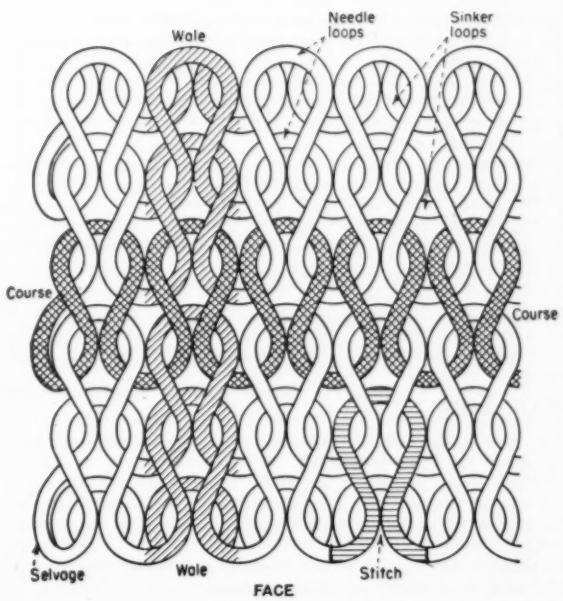


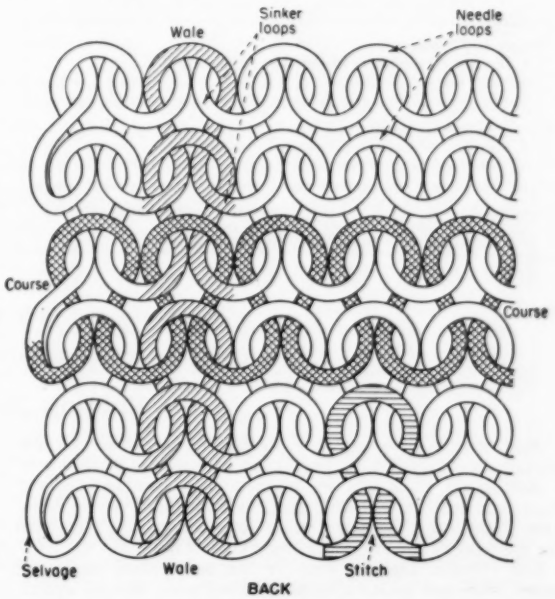
51-gauge, 15 den



60-gauge, 15 den

Parts of Knitted Fabric





Checklist for Komet Hosiery Machines

By JAMES H. BLORE, in TEXTILE WORLD

Changing Sliders

1. Remove the door at the location of the broken slider.
2. Remove one slider and its needle only; check the number, and replace immediately.
3. See that no foreign matter has accumulated in the slider slot.
4. Crimp the sliders away from the direction of rotation so that the amount of bend will allow the slider to move freely but not fall of its own accord.
5. Make sure that the correct slider is inserted. (If in doubt, consult the slider set-out.)
6. Makesure that the needle is hooked with the slider.
7. Push the slider in flush with the cylinder.
8. Tighten the door screws.

Changing Needles

1. Remove the top and bottom doors.
2. Do not drop the old needle between the cam box and the cylinder.
3. Put the bottom needle hook into the bottom slider hook.
4. Make sure that broken pieces of the old needle are removed from the slider hook.
5. Make sure that the needle is hooked to its slider - paring heights of adjacent latches and slider butts.
6. Reset the machine to start to prevent waste.

Changing Sinkers and Bluffs

1. Turn the machine to start or heel and toe. The faulty sinker or bluff should be opposite the main feed.
2. Loosen the sinker-ring nut under the bottom cylinder.
3. Push up the sinker cup from underneath with the nut.
4. Extract the faulty sinker and bluff with pliers.
5. Replace the sinker and bluff while you hold up the sinker cup.
6. Make sure that the bluff is on the correct side (over the slider-bluff bit).
7. Make sure that the sinker is in its correct position.
8. Drop the sinker cup.
9. Tighten the sinker-ring nut.
10. Do not turn the machine when the sinker nut is loose.

Timing and Starting

1. Turn the main drum to the starting position.
2. Turn the striper-selector levers away from the selector bar.
3. Set the chain to the top half of the brass link, and put the trip lever out of action.
4. Replace all broken elements, if necessary.
5. Run the fabric to the take-up rollers before knitting rib.
6. Check the position of the chain-saver rack wheel (in a position so that the low tooth is opposite the racking lever).
7. Put the main-feed yarn finger in position.
8. Be sure that all other yarns are threaded up correctly.
9. Be sure that the double-feed attachment is in time.
10. Line up the timing lever with the slot, with the main pawl ready to start its long rack.
11. Drop the pawl into position.

Press-off in Leg or Foot

1. Discover the cause of press-off.
2. Thread up the yarn.
3. Rack the chain to the starting position.
4. Rack the drum to the starting position (see **Timing and Starting.**)
5. Knit half a dozen courses.
6. Make sure that all latches of rib needles are open.
7. Transfer down by depressing the top transfer cam and turning the machine.
8. Check to see that every needle has one stitch.
9. Restart

Press-off in Heel or Toe

1. Raise the trip lever to allow the pawl to rack the drum out of the heel or toe.
2. Thread up the yarn and proceed as above.
3. Do not rack the drum when the machine is in oscillatory knitting.
4. Do not run the machine in heel or toe with the doors off.

Removing Cam Boxes

1. Set the machine at the starting position.
2. Put the heel-bolt cam and raising cam in such a position that the needles ride in a straight run.
3. Disconnect all levers, rods, springs, etc., without changing their adjustments.
4. Place all spares in boxes or on a clean cloth on the bench where they cannot be damaged or lost.
5. Pull the cam box off straight so the contour of the sliders will not be disarranged.
6. Remove all broken butts, foreign matter, lint, etc.
7. Check the cams for wear, cracks, looseness, protruding screws, etc., and check the functioning of movable cams.
8. If the machine is left, remove the belt and tie up the handle or remove the handle.
9. Wipe the face of cams with an oily cloth.
10. Make sure that the cam box fits flush to the cylinder.
11. Insert the correct screws. If they are tight, take off the cam box and investigate.
12. Tighten up screws progressively.
13. Connect the springs, rods, levers, etc.
14. Check to see that no parts remain unattached.
15. Turn the machine slowly by hand.

Knitting Stretch Yarn

Knit stretch yarns on your finest-gauge machines. Greater elasticity is obtained if the yarn is run on machines of finer cuts.

Knit stretch yarns with low tensions. High yarn tensions produce tight stitches, and little elasticity is obtained in the fabric even if the stitch cams are pulled low. Stripe in a spun yarn for the looper's rounds so the fabric doesn't run.

Use 140-den. aliginate yarns for the draw thread on Komet socks. This yarn makes a neater welt and saves time in separating. The socks can be pulled apart, and the loose ends will disappear in the scour or dyebath.

Use a lighter star-wheel weight on Komet machines; the regular weight is too heavy for stretch socks. Cut a piece off the regular weight or substitute an aluminum weight for the regular weight.

Hasten relaxation of socks for sizing and looping by placing the socks in a steam box for a few minutes.

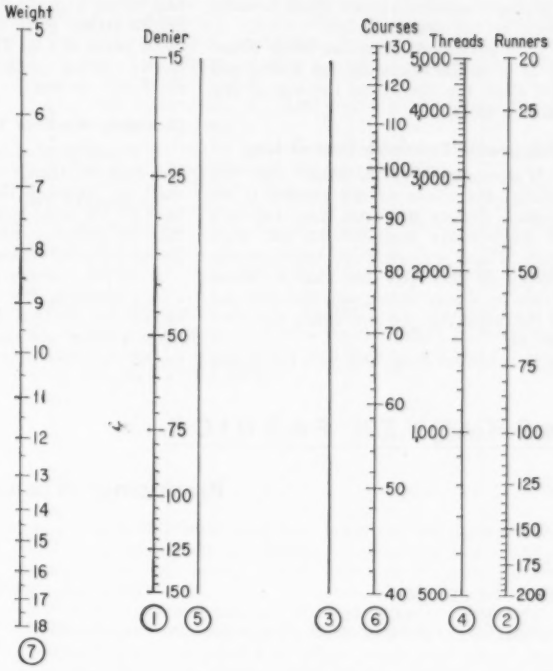
Warp-Knitting Production

This alignment chart has been devised by J. B. Lancashire to give the weight in pounds of a 60-yd. length of warp-knitted fabric when the number of threads contained in the fabric, the denier size of these threads, the number of courses per inch in the fabric, and the warp feed in inches per rack of 480 courses are known.

The chart lends itself to the variations that normally occur in fabric manufacture, such as the use of two, three, or four guide bars, each with different runners per rack and combinations of yarns of different sizes. When circumstances make it necessary, each different set of conditions can be dealt with separately and the total weight obtained by addition.

Although the range of the chart is unavoidably limited, readings can be adopted easily when they cannot be taken direct. For example, if 5,000 threads give a weight that is beyond the range of the chart, a reading can be taken for 2,500 threads and doubled. Here is the key to the nomogram:

Line 1—denier number of the yarn
Line 2—yarn feed in inches per rack of 480 courses
Line 4—number of threads used
Line 6—number of courses per inch in the fabric
Line 7—weight in pounds of 60 linear yards of fabric



How To Use the Chart

Place the edge of a ruler on the denier located on Line 1 and on the runner length located on Line 2. Use the place where the edge cuts Reference Line 3 as a pivot, and turn the ruler until the edge lies on the value of the threads on Line 4. Use the point of intersection with Line 5 as a pivot on which to turn the ruler until the edge lies on the value of the courses on Line 6. The weight of 60 linear yards of fabric is recorded where the edge cuts Line 7.

TUFTING

How Tufting Machines Are Used

Tufting machines are built in several widths. Bedspread machines are commonly 115 or 120 ins. wide, broad-carpet machines are 120 ins. wide for 9-ft. carpets, 180 ins. for 12-ft., and 216 ins. for 15-ft.

There's also a 30-in. carpet machine for fabric developments to avoid tying up larger production machines. Any carpet developed on this machine can be duplicated on the larger machines.

Shrinkage on broad carpets runs from 3 to 4% on jute and other heavy backing fabric up to 10% on lighter duck backing, according to finishing methods.

Machines are built wide enough to allow ample shrinkage. The two largest machines are built to the next largest finished width so that mills can use preshrunk backing to finish the carpets at tenter frames at the tufting-machine width.

Backing Shrinks to Desired Width

However, most mills buy backing in a predetermined width that shrinks to the desired finished width, and they tuft only to that width. All machines will tuft less than the full width, and 216-in. machines are often used to tuft 12- and 9-ft. carpets.

Two or more narrow widths of carpets are tufted simultaneously on the same machine. Sometimes the carpets are tufted on separate narrow strips of backing material, and sometimes full-width backing is used. The full-width material is split in the machine by removing a needle between the strips and inserting a razor blade or knife in its place.

When multiple widths of patterned rugs are tufted, widths can be either equal or varied. However, the length of the finished rugs has to be equal so that the pattern will end even on each rug.

Machine Gauge Can Be Doubled

The machine gauge is the distance between the needles across the machine. In the tufted fabric, this measurement is the distance between the lines of tufting. After a machine is built, the gauge can be changed only as a major and expensive change-over because all tufting units have to be replaced with parts of a different gauge.

But one comparatively easy change can be made by a mill: every second needle and tufting unit are removed to make a fabric of twice the gauge of the original machine. This change is sometimes made on bedspread machines to make both $\frac{3}{16}$- and $\frac{3}{8}$-in.-gauge materials. But it isn't economical to make this change frequently.

Selection of the correct gauge can be made only after you determine the fabrics most acceptable to your market. The most popular gauges are $\frac{3}{16}$ in. and $\frac{5}{32}$ in. During a recent 16-month period, broad-carpet cut-pile machines selected by mills were 88% in $\frac{3}{16}$-in. gauge and 12% in $\frac{5}{32}$-in. gauge. In this same period, broad-carpet loop machines selected were about 53% in $\frac{3}{16}$-in. gauge and 47% in $\frac{5}{32}$-in. gauge; all other gauges were less than 1%.

Older wider-gauge machines can be changed to the newer $\frac{3}{16}$- and $\frac{5}{32}$-in. gauges.

Pile and Stitch Change the Fabric

Pile height and stitch length are readily adjustable; and by making these adjustments, wide variations are made in the weight, quality, and appearance of fabrics. Most carpets are tufted with an average of seven or eight stitches per inch. But with given yarns, stitches are increased or decreased.

Practical limits are 4 to 14 stitches per inch. The stitch length is determined by the rate the backing cloth is fed through a machine and is changed easily.

Pile height is determined by the distance from the cloth to the hooks that form the tufts. This distance is varied by adding or subtracting shims between

the needle plate and machine bed.

After this distance is changed, you have to adjust the yarn feed so that it feeds the proper amount on each stitch to make loops of the desired height.

It is possible to raise the fabric about $\frac{1}{16}$ in. from the minimum nap setting and still allow the needles to rise out of the backing cloth.

Changeable Eccentrics Control Nap

If more nap height is desired after this setting, the stroke of the needles is increased. Newer machines have two sets of needle-stroke eccentrics on the main shaft. These eccentrics are timed at the factory so that you can change needle stroke by simply sliding one eccentric out of the connection rod and sliding the other one in.

The accompanying table gives the proper needle stroke for each nap-height range. There's duplication in the table; but for machines set up to make a special nap, it's best to use a stroke designed for this pile height rather than one designed for a broad range of nap. The nap range of the shorter strokes in the table is less than the longer strokes.

Changing Machine Type Is Difficult

It is not possible to run both cut-pile and loop-pile fabrics on the same tufting machine. Although the two machines are built on the same type of machine frame, they are different tufting units and operate on different principles.

A cut-pile machine can be changed into a loop machine, but a loop-pile machine cannot be changed into a cut-pile machine without machining the bedplate to provide for the knife shaft.

Stroke in inches	Nap range in inches
1	1/8 to 1/4
1 1/16	3/16 to 1/4
1 1/8	1/4 to 5/16
1 3/16	1/4 to 3/8
1 1/4	5/16 to 7/16
1 3/8	5/16 to 1/2
1 1/2	7/16 to 5/8
1 5/8	9/16 to 3/4
1 3/4	11/16 to 7/8

Changing the type of machine requires replacing all tufting units and is a major change. Except for changing the 30-in. sample machine for experimental fabrics, it is not practical to make the change.

Courtesy Cobble Brothers Machinery Co.

NONWOVEN FABRICS

Producing Washable Nonwovens

Nonwovens are now being used more commonly as interlining, padding, and insulation in apparel and household items. This progress comes from better fabric constructions to withstand laundering and drycleaning.

The design of washable or drycleanable nonwovens starts with the selection of the fiber blend. It includes web formation, binder type, binder formulation, drying and fusing or curing conditions, and web tension and handling conditions before and after finishing.

The cutter, too, should exercise care in his handling methods. Good tension control, for example, is particularly important to avoid distortion during cutting operations, especially with nonwovens of low strength or lofty types such as are used for padding and insulation. In this way, the desired dimensional, washable, and drycleanable properties can be retained.

Choice of a fiber blend is dictated largely by cost consideration weighed against the properties needed in the finished construction. Absorbency, resilience, physical strength, and elasticity are important considerations in selecting fiber type, grade, denier, and staple length.

The formation of a web is mainly a mechanical problem. For the best washability and drycleanability, the construction should be dimensionally balanced. This balance is most easily achieved if the fibers are deposited at random during formation of the web.

Choosing the right binder involves careful consideration of processing characteristics, effect upon properties of the finished construction, and the desired resistance to cleaning solvents and alkaline soaps and detergents. To achieve flexible production methods, binders should be chosen that can be modified readily to meet a variety of end-use requirements.

Where resilience is required, a butadiene-acrylonitrile copolymer has proved to be of great value. It can be used with all conventional fibers and blends, has inherent resistance to washing and drycleaning, and lends itself well to further compounding for specific end uses.

An acrylic polymer is particularly advantageous where color stability and lasting clarity are required. A vinyl-plastic binder combines high strength, dielectric heat sealability, and ability to withstand heat sterilization with good laundering and drycleaning properties.

Where washing and drycleaning characteristics are of the utmost concern, some modification of the basic binder may be necessary. Curing agents and accelerators may be needed for maximum resistance to cleaning solvents and alkaline soaps, or two or more binders may be used in a blend. A sulfur and zinc-oxide curing system is often used with a butadiene-acrylonitrile copolymer with resultant improved physical properties, enhanced wash resistance, and better resistance to common cleaning solvents, such as trichlorethylene, perchlorethylene, and Stoddard's solvent.

The addition of 5 to 10 parts of a thermosetting resin such as urea- or melamine-formaldehyde into the binder recipe gives further improvement in resistance to washing and drycleaning.

To get the best results from the binder system, proper drying and curing or fusing conditions must be used. These conditions vary according to the type of binder, the conditions of application, and the type of heating equipment available.

Careful packaging and shipping help avoid undesirable distortion of the finished construction.

Courtesy B. F. Goodrich Chemical Co.

Latices for Nonwovens

By ROY H. BOGGS, in TEXTILE WORLD

Latex binders for nonwoven fabrics must have special characteristics. In addition to excellent ageing qualities, they must be able to adhere well to various fibers and be compatible with a wide range of colors and chemicals if the nonwoven fabrics are to be dyed or printed.

An important requisite is a low rate of migration because it is very desirable that the backing should tend to agglomerate at the points of fiber contact, rather than to spread evenly along the length of the fiber. The migration effect is increased if the fabrics are can-dried.

This quality of staying put ties in with bond strength very directly, and good bond strength at a low ratio of latex to fiber is most important. The ratio of binder to fiber may go as high as 50% and as low as 5%. The materials are generally latices or mixtures of latices with resins.

Binders for nonwoven fabrics are formulated to produce a wide variety of hands. Nonwoven fabrics for specific uses should be bonded so that they can be laundered or drycleaned. In any case, binders should be stable to application by impregnation, flotation, or spraying.

Making Nonwoven Fabrics

Nonwoven fabrics are produced in thicknesses from paper-thin up to 2 ins. A 40-in. web-forming machine for nonoriented fibers produces from 30 to over 300 lbs. per hr.

By proper selection of bonding and finishing agents and by using them with various methods, strength, flexibility, hand, absorbency, permeability, wet strength, and drycleanability can be built into a fabric.

Wet Process

Basically the bonding and finishing are either wet or dry.

In the wet-resin or latex-bonding method, the fabric web is continuously impregnated or sprayed with a suitable binder solution or emulsion:

1. Polyvinyl acetate
2. Polyvinyl chloride
3. Rubber latex
   a. Natural
   b. Synthetic
4. Reclaimed rubber dispersions
5. Asphalt emulsion
6. Starch
7. Casein
8. Acrylics

Bonding agents received as solids or resin powders may be put in a solution to the desired concentration. Rubber-latex dispersion and other bonding agents subject to emulsion are diluted to the desired solids concentration. The ability to vary solution or emulsion formulation provides a wide range of physical properties in the finished webs.

Dyes and pigment may be added to the binder formulation to color the finished product.

Bonded webs can be printed, generally by using the same pigments and equipment used for woven goods.

Dry Process

In the dry or plastic-fiber bonding process, the binder fiber, for example thermoplastic fiber, is first blended with the nonthermoplastic fiber in varying proportions ranging from 5% to 40% of the total blend.

The blending operation may be carried out on any type of opener that will produce a uniform blend of fibers. The resultant blend is then fed directly to the web-forming machine for processing into the finished web.

Courtesy Curlator Corp.

CLOTH ROOM

Cloth-Grading System

This system for charging second-quality cloth to weavers gives the weaver with the most defects in a roll of cloth the lion's share of the bad cloth. On the other hand, weavers with only minor defects get credit for a small share of the yards of seconds.

The over-all results are that every weaver does his best to make good cloth because he is given the proper credit.

The system works this way:

Seconds per roll of cloth are charged to weavers by the following rule:

1. Add each shift's points. Allow four points for a major defect, one point for a minor defect.

1st shift:	4 major, 2 minor—18 points
2nd shift:	5 major, 1 minor—21 points
3rd shift:	6 major, 1 minor—25 points

2. Add the three shifts' points together.

$$18 + 21 + 25 = 64$$

3. Divide the total points into the total yards. (110 yds. in this case)

$$110 \div 64 = 1.7$$

4. Multiply the answer you get by each shift's points.

$$1.7 \times 18 = 30.6$$
$$1.7 \times 21 = 35.7$$
$$1.7 \times 25 = 42.5$$

5. Add the total points together. This will give you within 1 or 2 yds. of the total. You may have to add or subtract a little to make your total even.

30.6.....	31
35.7.....	36
42.5.....	43
108.8.....	110

6. Charge each shift with the rounded-off number of yards of second-quality cloth.

Labor Saving in Cloth Rooms

Today's cloth rooms resemble auto-assembly lines. Power hoists, conveyors, and more-efficient inspecting machines are being used.

In one mill, an old cloth room had 15 inspecting machines served by three men on each of three shifts. These men put on new rolls of cloth and removed the inspected fabric. The machines were stopped for some time during these operations.

Now, with a rack behind each machine, two rolls are positioned for inspection; and when one is run out, the end of the new roll is pinned to the end of the old roll to avoid rethreading the machine.

Individual pieces are doffed by the inspector from a simple batcher and fall on a conveyor that takes them to a sorting station from where they go to storage.

One Shift Is Eliminated

The plant added nine more machines and went to a two-shift operation. It still produces about 600,000 yds. of cloth per week. Inspection is better, and the operation is done with three less employees, who were transferred.

A second mill double-checks its production in a modern cloth room located between two weave sheds. Cloth is cut from the looms in 400- to 500-yd. rolls, which are sewed into 3,000-yd. rolls at the brushing and shearing units. Scrays permit continuous operation while the rolls are sewed on.

Power hoists and a monorail system are used to get the large rolls to the inspecting machines and then to hookers where they are given a second inspection after they have been hooked off. Some fabric is inspected and rolled.

Air guiders produce evenly wound rolls in both types of inspection. Up to 1,400,000 yds. per week is handled with 43 employees in this cloth room.

Efficiency Is Increased 20%

A new building, new equipment, and improved machine layout increased another mill's cloth-room efficiency 20%.

This plant cuts 150-yd. lengths from the loom, mostly in fairly heavy fabrics such as tickings, drapery goods, gabardines, twills—some 50 styles in all. About 600,000 yds. of cloth is inspected weekly on a two-shift system that requires a total of 38 operators. Quality and production are maintained by a system that is designed to reward good work with cash bonuses.

A conveyor takes inspected rolls to the next department, where they are brushed and sheared and made up into 1,000- to 1,200-yd. rolls in the various styles.

Fast Inspection Reduces Seconds

A fourth mill gets goods from loom to inspection machines as fast as possible. Quick inspection reveals weaving faults before much more yardage is affected.

Cloth is delivered to 24 inspectors ranged at two rows of 12 tables. A conveyor receives all graded cloth as it is produced and takes it to a platform where the firsts and seconds are separated by styles and placed in trucks.

Prompt inspection and a minimum of manual handling help keep this plant's quality up and cloth-room operating costs in line.

At another mill, goods passing through the cloth room are lifted manually only twice, once from weave-room trucks and once when individual cuts go into packing cases.

This plant runs the loom cuts into 1,000- to 1,200-yd. rolls and shears the goods before inspection.

Power hoists take the rolls by a monorail system to the grading machines. When a cut is graded, it is dropped on a conveyor that takes it to the shipping area.

First-quality goods are cased at this point. Seconds are separated for regrading and put in a bin until enough pieces in one style are available for casing.

How To Figure Cloth Contraction

It is often important to know how many yards of yarn will be needed to weave a given number of yards of cloth. The percentage of contraction will vary greatly depending on cloth construction and yarn numbers.

For an accurate check, take a 9-in. square of cloth and unravel some warp and filling ends. Pull the threads straight but don't stretch them, and measure with a ruler.

Divide 9 by the length of the straightened yarn, and subtract the result from 100 to get the percent of contraction.

For example, an end of warp yarn from a 9-in.-square sample measures 9¼ ins. Therefore, $9 \div 9.25 = 97.29$; and $100 - 97.29 = 2.71\%$ contraction. The contraction of the filling yarn is figured the same way.

A fairly accurate estimate of the warp contraction of average weaves can be made before the cloth is woven. Multiply the number of picks per inch by 3 and then divide the result by the filling numbers.

For example, if there are 48 ppi and the number of the filling is 20s, the calculation is: $\frac{48 \times 3}{20} = 7.2\%$ contraction.

Chart for Cloth-Analysis Problems

To Find Average Yarn Number

Example: Cloth is 27 ins. wide, weighs 7 yds. per lb. and has 66 ends and 62 picks.

Connect (broken line 1) 27 ins. on the width line with 128 (66 ends + 62 picks) on the ends-and-picks line. The *N* line is crossed at 460.

Connect 460 (*N* line) with 7 on the yards-per-pound line (broken line 2). This line crosses yarn-number line at 32, average yarn number in the cloth.

To Find Yards per Pound of Cloth

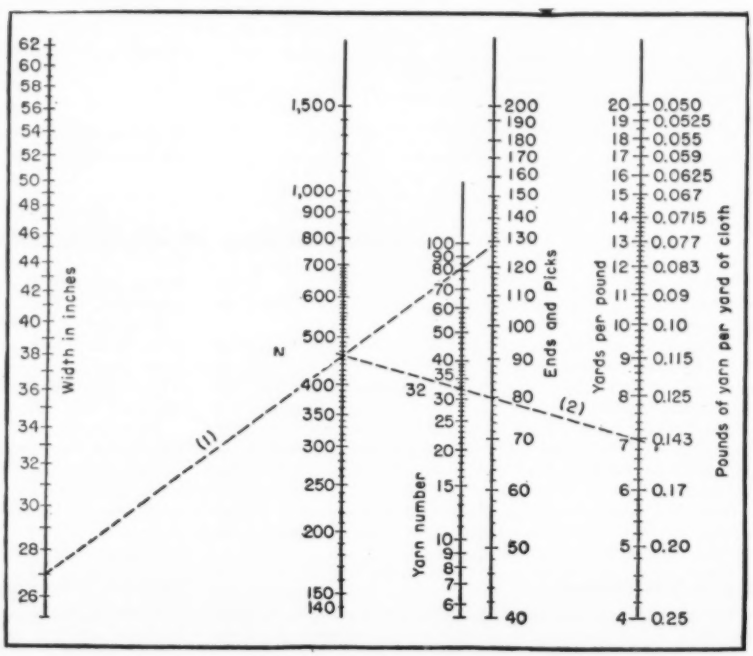
Example: Cloth is 29 ins. wide and has 58 ends and 64 picks; average yarn number is 36.

Connect 29 on the width line with 122 (58 + 64) on the ends-and-picks line. The *N* line is crossed at 470.

Connect 470 on *N* with 36 on the yarn-number line. The line, extended, crosses the yards-per-pound line at 7.7.

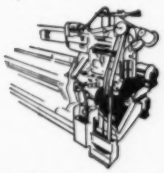
Other Uses

The chart can be used in a similar way to find other unknown factors from given known factors.

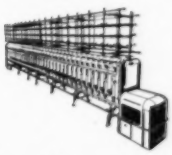


Your engineering staff has been busy

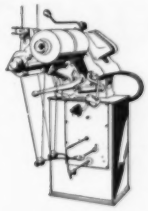
The extensive, well-staffed research and engineering facilities of **UNIVERSAL WINDING COMPANY** are working for *you*. Always alert to your problems in winding and twisting, they're constantly endeavoring to find the *best* solutions . . . by improving present machines . . . by developing new ones. The results are evident throughout the textile industry, where LEESONA® Machines such as those illustrated and described on this page are making possible more efficient production . . . better quality . . . higher profits. For the best solution to *your* winding and twisting problems write UNIVERSAL WINDING CO.



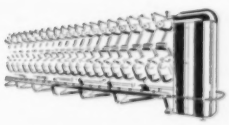
UNIFIL® Loom Winder. Brings the entire process of filling yarn preparation right to the loom. Automatically winds quill, loads shuttle and strips in one continuous cycle. Provides versatility and improved fabric quality at lower cost per yard.



Model 10 Ring Twister. Unbeatable flexibility wherever two or more ends are to be combined. Handles any natural or synthetic yarn . . . all types of delivery packages. No. 511 attachment for Saaba* Textured Yarn.



No. 959 Take-Up Machine. Gives producers of man-made fibers the fastest take-up at constant speed on precision wound tubes or cones. Other LEESONA Take-Ups are available for slower speeds and for coarse materials.



No. 210 Twister Coner. Combines twisting and coning of filament yarn into a single process. Eliminates one step in production. Inserts twist from a fraction of a turn to several TPI.

ROTO CONER®. Quiet, trouble-free production of every type of open-wind package. Rotary-traverse assures soft packages of uniform density.

UNIRAIL® Uptwister. High-speed production (up to 16,000 r.p.m.) and improved quality at lower costs. Bobbin or tapered headless package take-up.

No. 50 Precision Winder. Most versatile precision winder available. For winding all natural and synthetic yarns.

Stretch Yarn Machines. False twist spindle produces uniform stretch yarn in one operation at high speeds.

Portable Uniformity Meter. Automatically checks evenness of product "on the spot" in one minute without interrupting production at cards, drawing frames, combers, roving frames, and spinning frames.

**Saaba is a trademark of Universal Winding Company*

23.8.57

LEESONA

UNIVERSAL WINDING COMPANY

P. O. Box 1605, Providence 1, Rhode Island

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Agents in every principal textile center throughout the world.

No. 11 in a series—How your Du Pont salesman is backed by many sales-building activities, including Fiber Research, Technical Service, Fabric Development and Merchandising.

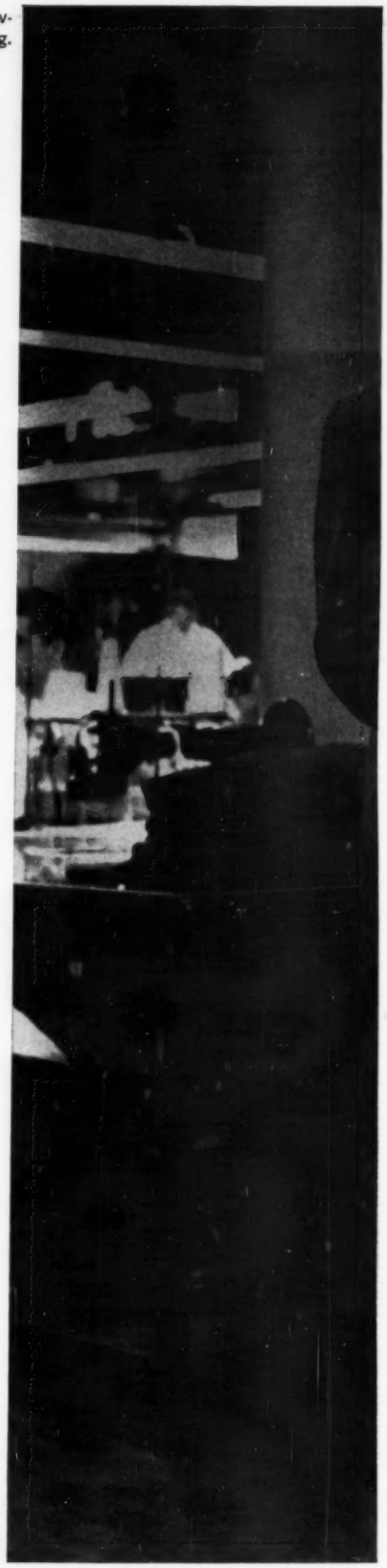
The man from Du Pont lends a hand in the cutting room

Meet George Bollinger (left) of Du Pont. He's a Technical Service Representative in our Fabrication Group. That's quite a title, and here's what it means . . .

George is one of a group specializing in developing the best techniques and materials for tailoring garments of our fibers. These men know cutting, sewing and garment finishing, just as other Du Pont Technical Service Representatives know knitting, weaving and fabric finishing. George (shown here with Louis Scalise, Vice President and head designer at Witty Bros., and head of Custom-Edition Clothes by Scalise) and his cohorts work with apparel manufacturers to help insure that the consumer gets all the performance advantages made possible by Du Pont fibers. Achieving true wash-and-wear performance has, of course, been a major project.

Last year, over 1,800 apparel manufacturers received Technical Information Bulletins from the Fabrication Group—and over 500 attended the Group's ten educational clinics.

What it all adds up to is this: Du Pont helps the manufacturer to produce garments that will sell and satisfy . . . and this helps our customers sell more fabrics made with Du Pont fibers.



From raw fibers to retail sales
. . . Du Pont helps build profits for you

PRODUCT and PROCESS NOTES FROM DU PONT

"Dacron"* Type 61 polyester staple is specifically designed for industrial uses requiring the physical and chemical properties of conventional "Dacron" Type 54 *plus high shrinkage.*

In the presence of hot air or hot water, "Dacron" Type 61 will shrink approximately 45%. This property makes it possible to produce non-woven felts of 100% "Dacron". "Dacron" Type 61 staple fibers are carded to form a batt which is needle-punched to interlock the fibers. This needled batt is then exposed to hot water or hot air to produce a felt.

Blended with wool in woven felts, "Dacron" Type 61 has sufficient shrinkage to permit it to ride and pack with wool during fulling and assists in closing and stabilizing the felt fabric.

Filtration, wicking, sealing, cushioning, spacing and lubrication are among the industrial uses for felts which benefit from the unique combination of properties possessed by "Dacron" Type 61.

"Civona" rayon**—Your favorite lady's hat this summer may be made of "Civona", the latest addition to Du Pont's collection of rayon fashion yarns. "Civona" yarns are crisp, lofty and readily dyeable in a full range of seasonal colors. Currently available in only one count, 600-20 dull, "Civona" rayon is also being evaluated for use in draperies, casements, dresswear and toy-plush fabrics.

"Taslan"* textured yarn**—Several hundred new fabrics and garments utilizing "Taslan" textured yarns were shown recently to the press at a meeting in the Du Pont office in the Empire State Building. A number of the interesting items displayed were of foreign origin. Special attention was focused on the novelty yarns made possible by multi-end and variable-feed texturing. It was forecast that textured yarns of all types would grow to a 100-million-pound market by 1964, with "Taslan" accounting for about 25% of the total.

*Du Pont's registered trademark for its polyester fiber
**Du Pont's trademark for its hollow-filament rayon fashion yarn
***Du Pont's registered trademark designating textured yarns made in accordance with quality standards set by Du Pont

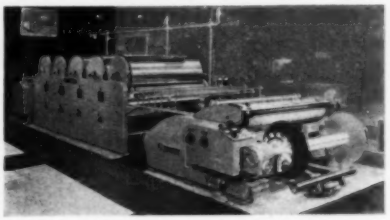
DU PONT
REG. U. S. PAT. OFF.
BETTER THINGS FOR BETTER LIVING
... THROUGH CHEMISTRY

Standardization Cuts Costs

Cocker builds all types of warping and slashing equipment, and many types of finishing machines. Standardization of construction requires fewer maintenance parts and cuts your inventories considerably.

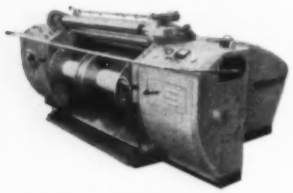
Cocker has a world wide reputation for engineering and manufacturing the finest in textile machinery. Cocker controls all production—from castings to the finished assembly—in its new and modern plant and is able to guarantee every machine and every part to perform exactly as claimed.

THE COCKER HIGH SPEED SLASHER for all types of yarns . . . with the World's Finest Drive



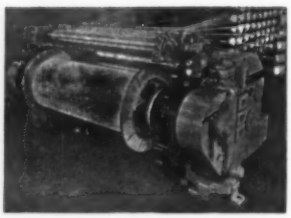
These slashers are built with 5, 7, 9, 11, and 13 cylinders. Heavy construction permits sustained and vibrationless speeds up to 150 yds. per min. This is the most modern slasher in the world, with such features as (1) Differential Compensating Friction Control which permits continuous high speeds without heating (2) The Cocker Friction, which produces hard beams and gives 20% to 30% more yarn per loom beam (3) New type loom beam carriage and air operated presser roll on head end. All operations are under automatic push button control.

The New Cocker Slasher Head Drive is better, simpler, and less expensive. It eliminates the expensive gear head motor and the noisy troublesome belts, chains, and sprockets. Its telescoping torque tube drive with two universal joints transmits power to a gear reducer which drives the beam driving head direct. The same drive will be used on all models, thus reducing parts inventories materially.



New Cocker Multiple Beam Tricot Warper (MB55-32)

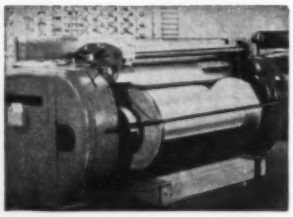
This versatile warper will handle 2—21" beams, 1—42" beam, 1—50" beam or 1—55" Raschel beam with a simple changeover from one to the other. Individual controls are in full view and easy reach of the operator. Has all modern features and safety devices. Normal sustained speeds up to 600 yds. per minute.



Cocker All Purpose Warper (SD-54)

Shown here is the Dye Beam model of this versatile warper. The air-controlled presser roll can be set to produce any desired density—hard or soft—and accurately maintains that pressure from beginning to end. It produces soft dye beams which permit lower and evener pressures in dyeing—quick and even dye penetration—and speeds of 550 yds. per min. It practically eliminates the possibility of "blown" dye beams.

Many features make this the ideal warper for any purpose. Horizontal traverse on comb and roll prevents channelling. Driving and braking beam from both ends eliminates backlash in starting or stopping. Other features are patented differential yarn speed control, electrically controlled doffing, and extra heavy bearings. Operates at over 700 yds. per min. on general warp beams.

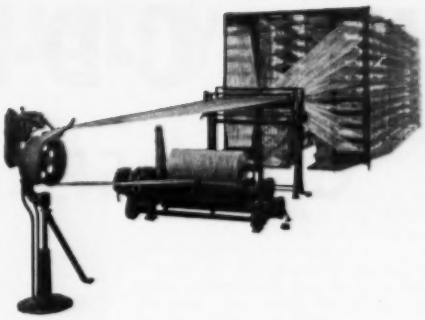


Cocker High Speed Spindle Driven Warper (SD-49)

This warper was designed especially for synthetics but will handle any type yarn. Produces unexcelled synthetic warps—from finest deniers to heaviest tire cord yarn. Takes section beams with flanges up to 36 inches diameter. The SD-49 will produce warps of any desired density at speeds up to 1000 yds. per minute.

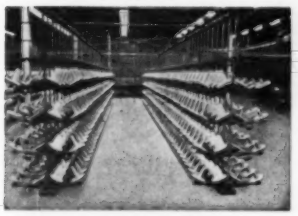
Cocker High Speed Balling Warper

This warper is fully ball bearing with chain traverse. Automatic counter and leasing clock. Metal draw rolls. Individual motor drive with speeds up to 450 yds. per minute.



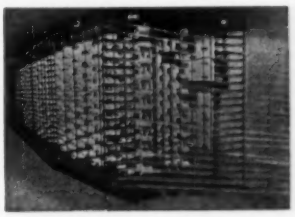
Cocker Gassing Equipment

Cocker engineers and builds complete gassing equipment. The Cocker installation shown here includes double head machines, running from 760 end horizontal magazine cone creels, built for jumbo cones. Each machine produces 600 lbs. per doff. Gassing speeds about 150 yds. per min., with adjustable drive to run up to 450 yds. per min. without gassing.

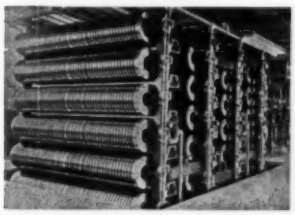


Horizontal and Vertical Cone Creels

Cocker designs and builds Magazine Cone Creels with Electronic Stop Motions for any purpose and any type package. The adjustable tension with balloon breaker is a valuable feature of these creels.

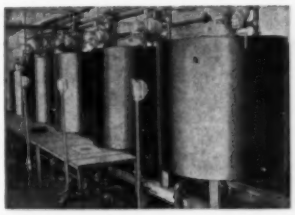


The Finest in Stainless Steel Equipment



Cocker's new and modern stainless steel plant will produce any type equipment built to your specifications—at attractive prices.

- Cooking and Storage Kettles
- Cloth Dye Boxes
- Drying Ranges
- Cylinders of all Types
- Sizes Boxes
- Warp Steam Chests
- Hoods
- Special Equipment



Cocker Heavy Duty Padder for Dyes, Starches, and Finishes (Model 157)

This new padder has unit construction, with heavy cast iron frame and heavy duty, self-aligning roller type roll bearings. Direct roll loading up to 10 tons. Can be furnished with attached cloth guiders—open or closed heating coils—low or high capacity pans and integral mounted expander rolls. Widths up to 120 inches. Attractive in appearance.

The Nemo Jet Cooker*

Manufactured and sold exclusively by Cocker. Cooks size only as needed. Reduces waste and stabilizes size viscosity.

*Pat. Applied For

ALSO: High Speed Narrow Fabric Warpers
High Speed Collecting Beamers
Heavy Duty Rebeamers for Unsized Warps
Warp Dyeing Machines
Special Warp Handling Equipment
Engineering Service

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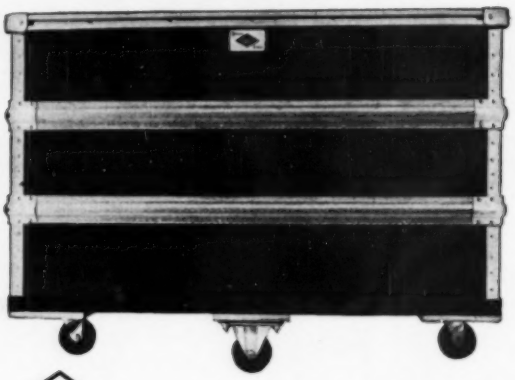
MAILING ADDRESS
Gastonia, N. C.

WORLD'S LARGEST DESIGNERS AND BUILDERS OF COMPLETE WARP PREPARATORY EQUIPMENT

How C-D-F Products Help

C-D-F SPARTAN TRUCKS



MOVE MATERIALS FAST, SAFELY, ECONOMICALLY

Mill economy starts with quality. Therefore, you *save money* by using C-D-F Spartans, the finest fibre hand trucks made, because they move faster, last longer than cheaper substitutes.

ROUNDED METAL CORNERS help the Spartan truck bounce and slide past machinery. Eight rivets on each corner practically eliminate popped seams.

ONE-PIECE TOP RIM • All-metal, rust-resistant, no overhang inside truck — nothing to catch elbows, fabrics, yarns — no wood to splinter and snag textiles.

BEST OAK BOTTOMS • Solid tongue-and-groove or open slatted, painted or varnished.

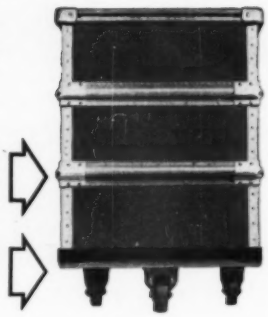
C-D-F FIBRE BODY • Rugged, scuff-proof, lasts for years without maintenance. Wipes clean easily. Colors (red, gray, olive-green) are part of the fibre itself, can't scar or chip off.

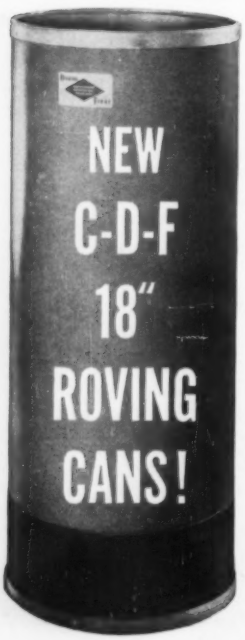
STANDARDIZE ON C-D-F SPARTAN TRUCKS — they help the textile man's day run smoothly!

CHOICE OF CASTERS
Any make, size, type may be supplied. All types keep your SPARTAN light on its wheels, turning and swiveling smoothly.

STURDY METAL BODY BANDS
Designed for textile mill use, these bands are extremely strong, bounce the SPARTAN truck away from ring rails, have no protruding edges to catch moving machine parts.

KICK BAND
of welded angle iron protects sides of hardwood bottom.





SMOOTH OUT COTTON & SYNTHETIC ROVING WITH SEAMLESS, SNAG-FREE C-D-F CANS

Why fibre roving cans? Because Diamond Vulcanized Fibre, one of the strongest, most durable lightweight materials, is also an excellent electrical insulator. Hence you get smooth, static-free passage of synthetic yarns into and out of C-D-F fibre roving cans, especially with the rolled and turned fibre top cans where roving contacts no metal at the top rim.

They're seamless and slick from top to bottom, finished inside and out with moisture-resistant enamel. Sturdy galvanized metal bottom secured by rust-resistant ring. Tough fibre kick band on every can.

NEW SIZES: 15"- and 18"-diameter cans, 36" or 42" high, are standard stock items at C-D-F Spartanburg, S. C. Other sizes and styles are available to meet your needs.

THREE TOP-RIM STYLES

METAL TOP RIM of 16-gauge rust-resistant steel, smooth and snugly fitted around can. Nothing hampers flow of cotton into and out of can. Bales can be supplied to increase capacity.

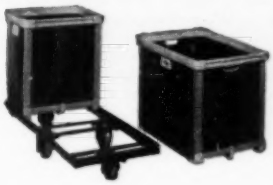
ROLLED FIBRE TOP RIM eliminates static charge when running synthetics. Fibre is turned over on itself two-and-a-half times, giving high rim strength plus snag-free smoothness.

TURNED FIBRE TOP RIM. Heavy wire ring reinforces turned fibre top. This design, besides eliminating static charge, provides a flare at the top for smooth exit of roving.

The Textile Industry

C-D-F FIBRE MILL BOXES, the most durable receptacles for doffing and other mill uses, are made of a heavy grade of genuine Diamond Vulcanized Fibre; they have a rust-resistant metal top rim similar to that used in Spartan Trucks. Cut-in hand-holes are steel-reinforced, and corner angles give box rigidity and long life. Runners are solid maple, metal-covered or with metal end-clamp.

C-D-F FIBRE TOTE BOXES are made of a lighter grade of fibre for easy handling and light weight, and have metal, hardwood, or metal-covered wood top rims. Furnished with metal corner angles or simply riveted.



C-D-F FIBRE DOFFING TRUCKS

Two durable Diamond Fibre boxes combined with a strong, easy-running truck. Notice the way these boxes are constructed — no skimping on rivets . . . smooth surface inside and out . . . everything designed to speed the job, keep machines humming! The C-D-F sales engineer can help you choose the right size. He checks the width of your post alleys and cross alleys, height of ring rail, number of spindles to be doffed.

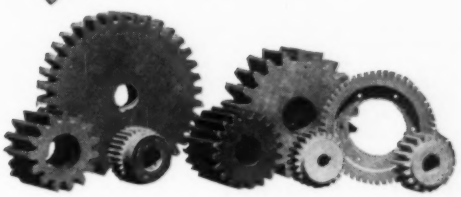
C-D-F FIBRE BARRELS

Here's another high-quality C-D-F product. This C-D-F barrel is light-weight, easy to handle, easy to keep clean; oil and grease are speedily wiped off. Like other products made of Diamond Vulcanized Fibre, the barrel is exceptionally strong and long-lasting. Top rim is spun metal, handles are metal-reinforced. Kick bands furnished in fibre or metal. Metal or wood bottom, with or without casters.

C-D-F FIBRE AND CELORON LOOM PARTS

Carried in stock at Spartanburg: CLOTH ROLL BLOCKS of Diamond Vulcanized Fibre are non-splitting and long-lasting, reduce wear on metal cloth roll bar. BINDER BUSHINGS of all sizes are available. PARALLEL PLUGS of molded Celoron need no lubrication, last for years, will not delaminate, splinter, fracture, or soften. KNIFE GUIDES can be supplied in Diamond Fibre or Celoron, are absolutely strong and straight.

CDF CELORON® PLASTIC MAKES STRONG, SILENT GEARS



Here's an amazing C-D-F plastic that works miracles in textile machinery—CELORON, a golden, strong resinous material that's easy to cut into gears. Celoron gears require no lubrication, have high impact strength, excellent resistance to heat, oil, water. Because they're non-metallic, they eliminate noise and reduce wear on mating metallic gears.

Your C-D-F sales engineer knows many proven, highly successful applications for Celoron. Ask him, or call Spartanburg 3-6397 for Celoron gear blanks. We guarantee to get a band-sawed gear blank on the way to your gear cutter *FAST*.

NEW FABRICATION FACILITIES AT SPARTANBURG, S.C.,

provide better service than ever for the Southern textile industries. At the C-D-F Southern plant and warehouse, 834 Hayne St., Spartanburg, S.C., fibre and Celoron parts are machined and fabricated to your specifications—quickly, expertly, economically. Call Spartanburg 3-6397 for fast help from your C-D-F sales engineer!

What CDF makes for the mill operator

Barrels
Bearings—cloth roll, jig
Blades—separator
Boards—examining
Bobbins
Boxes—battery-filling, bobbin, conditioning, doff, mill, quill, spooler, tote
Buckets—spinning
Bushings—binder
Cams
Cans—roving, waste
Connectors—dobby
Couplings
Gears—auxiliary, card, coiler head, fitting, motor pinion, quill, picker, spinner, spooler
Guides—knife
Picker—stick parts
Pins—binder
Pirns
Plates—lay
Plugs—parallel
Pot-eyes
Pulleys
Receptacles
Rolls—lap
Rollers
Separators
Sheets—bin-lining
Shuttle parts
Tabs—binder
Track—tenter frame
Trucks—cloth, conditioning, doff, filling, quill, roving, spinning, spooler, twisting, waste, winding
Tubes—core, sizing
Tubing—spiral
Washers

CDF **CONTINENTAL-DIAMOND FIBRE**

A SUBSIDIARY OF THE Bird COMPANY • NEWARK 44, DELAWARE

IN CANADA: 46 Hollinger Road, Toronto 16, Ont.

C-D-F has four plants, sales offices in 28 principal cities and Canada. Write for office nearest you and for Receptacles Catalog showing the complete C-D-F line.

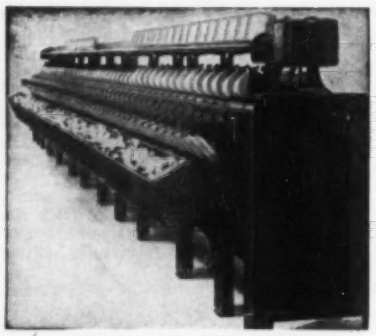
FOSTER MACHINE COMPANY

WESTFIELD, MASS., U.S.A.

Southern Office, Johnston Bldg., Charlotte, N. C.

Canadian Representative—Ross Whitehead & Co., Limited,
2015 Mountain St., Montreal, Que., and 100 Dixie Plaza, Port Credit, Ont.

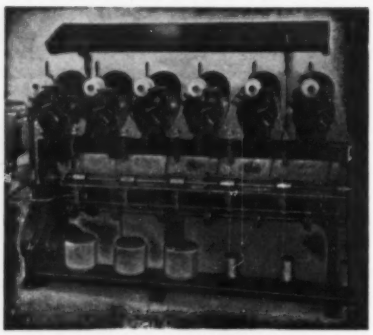
European Representative—Muschamp Textile Machinery (Sales) Limited, Eider Works,
Wellington Road, Ashton Under Lyne, Lancashire, England



MODEL 102 HIGH SPEED WINDER

MODEL 102 WINDER

Suitable for winding all types and counts of staple yarns. Can be equipped to produce open wind knitting cones, warping cones, parallel tubes or dye packages with traverses up to 7 inches. The tube or cheese winder can wind up to 600 and the cone winder up to 750 y.p.m. giving about twice the production of obsolete machines with 1/3 less labor. Flexibility or adaptability to changing requirements is an outstanding feature. With simple changes it will wind any standard taper cone, any angle of wind from 9° to 18°, package dyed yarns, even if damp, or conditioned yarn. Conditioning attachment is optional while self-threading tension and slub catching attachments, double empty bobbin conveyors, steel top creels and steel side boxes are standard equipment. Made with 10 to 120 spindles per machine. Bulletin A-95 on request.



MODEL 75 PRECISE WINDER

MODEL 75 WINDER

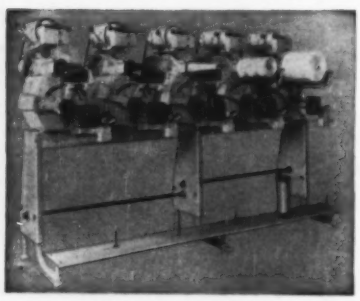
Suitable for precision winding of all types of filament yarns and cotton thread yarns. Will produce straight edge cones or parallel tubes with traverses up to 6", or pineapple cones by means of a special attachment. Spindle speeds up to 1500 r.p.m. Slow starting device—Foster-Zenith Yarn Cleaner—automatic stop motion—straight-line yarn oiling attachment—guideway balance spring—totally enclosed lubricated parts. Ball bearings on spindles and drive shaft. Indivdual spindle drives with 180° angle wrap around spindle pulleys. Only 2 H.P. motor for 36 spindle machine. Rigid construction and wide angle oversized cams reduce vibration and upkeep. Six spindles to a section; up to eight sections per machine. Bulletin A-92-A on request.

MODEL 78 WINDER

For precision winding of tire cord, or coarse cotton or wool yarns from bobbins or skeins to tubes or cones with 8" to 10" traverse and weighing up to 35 lbs. each. Ball bearing spindles, individually motor driven. 1¼ h.p. for 5-spindle Machine. Operator controlled slow start and spindle brake. Adjustable belt gainer. Easily positioned, single weight adjusting pressure and pressure release mechanism. Positive size stop, using long life micro switch. Guideways mounted on roller bearings. Individually serviced heads. Expansion-type tube and cone holders permit quick doffing and donning. Bulletin A-98A on request.

MODEL 76 SIZING MACHINE

The original machine for sizing nylon yarn. Produces a barrel wind package on a 6" dia. Bakelite tube. This package assures even drying and easy give-off. Spindle speeds up to 2500 r.p.m. Ball bearing spindles and drive shaft—slow traversing sizing rolls—change gears for regulating percentage of size—anti-wear tension and guide parts—stainless steel troughs and rolls. Built 6 spindles to section—up to 7 sections per machine. Bulletin A-97 on request.



MODEL 78 PRECISE WINDER

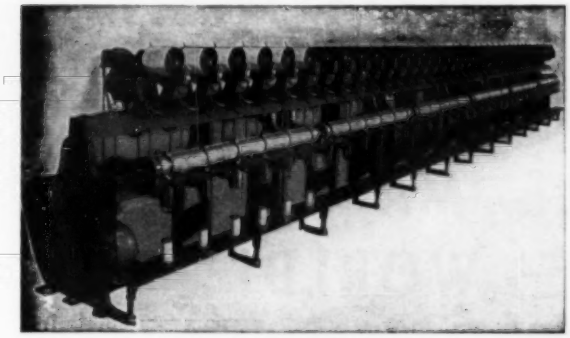
MODEL 57 DOUBLER

For winding two or more ends parallel on 6" or 7" tubes (from bobbins or cones) as a supply for twisting any type and count (except the coarsest) of staple yarn and combinations of staple and filament yarns. Winding speed up to 400 y.p.m. Ball bearing shaft—V belt drive—self threading, spring suspended tensions—slub catchers for single process doubling, adjustable individually or as a group—quick acting stop motion—conveniently located starting handle—quick and easy threading and doffing. Makes possible a round ply yarn free from corkscrews and rough places, eliminates dropped ply and reduces time required for creeling twisters. 20 to 120 spindles per machine. Bulletin A-96 on request.

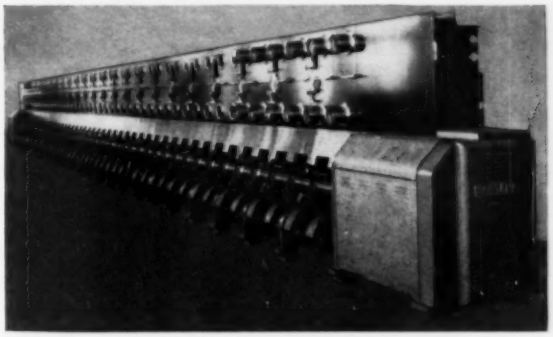
MODEL 56 DOUBLER

Similar to Model 57 machine but designed for doubling coarser counts. Doubles or folds 2 to 6 ends up drawing from bobbins or cones and produces an 8" traverse, 10" diameter package, containing approximately 10 lbs. of yarn. Winding speeds up to 350 y.p.m.

FOSTER MACHINE COMPANY, WESTFIELD, MASS., U.S.A.



MODEL 76 NYLON SIZING MACHINE



MODEL 403 TAKEUP WINDER

MODEL 403 TAKEUP WINDER

For continuous winding of meltspun synthetic fibre yarns direct from spinneret at speeds up to 6000 ft. per minute. Yarn (15 to 1200 drawn denier) travels from spinneret down through heated chimney to tandem finish rolls, with ceramic guides under each to maintain proper arc of contact, to a series of Godet feed rolls, a traverse guide and the package core, which is driven by a 6" dia. chrome plated steel roll. Pressure of package on roll automatically adjusted, as its weight increases. One 5¼" traverse package, two 3¼" traverse packages, or four 1" traverse packages per holder. Drive roll shaft and feed rolls driven by separate synchronous motors. Ribbon wind eliminated. 16" gauge, 56 spindles with 2 independent drives (28 spindles each). Other specifications if desired.

MODEL 77 WINDER

Suitable for precise winding of 8/3 to 8/100 to cones or tubes with traverses up to 8". Six spindles per section. Up to 6 sections per machine. One motor for 6 to 60 spindles. Equipment for overend or unrolling supply. Ball bearing spindles and drive shaft. Spindles individually belt driven for uniform speed and no slippage. Positive belt gainer mechanism accurately controls lay of yarn. 90° build-up from face of cone prevents broken back and under-wound packages. Tilting head permits slow start. Doubling attachments for up to 3 ends available. Bulletin A-99 on request.

TENSIOMATIC WINDER

For continuous winding of wetspun or dryspun synthetic yarns direct from spinneret to 6" traverse packages (1 or 2 packages per position) or a 10" traverse Model 78 package weighing up to 20 lbs. Speeds up to 450 feet per minute. Precise wind machine. As package builds up and the tension on the yarn increases, the latter actuates an electronic control which slows down the motor driving the spindle. Thus a constant winding speed is maintained.

FOSTER-MUSCHAMP MODEL 66 AUTOMATIC FILLING WINDER

Suitable for winding all types and counts of spun and filament yarns. Standard machine is 32 spindles. Increases production per operator by 300% over competing automatic equipment. One operator can handle 4,000 net pounds per 8 hr. shift at a cost of about ¼¢ per lb. of yarn quilled. Operates at spindle speed of 15,000 r.p.m. while preserving the original quality of the yarn and producing practically perfect bobbins. Operator has only to keep magazine creel loaded and thread up. Everything else automatic, including conveying empty bobbins to spindles, starting and stopping spindles, doffing of full bobbins and conveying them to pinboards. Different counts or colors can be run on different spindles of same machine at same time. Bulletin No. M-4 on request.

OTHER FOSTER EQUIPMENT

MODEL 24 WINDER—for winding tire cord or other coarse count yarn to 10" traverse open wind cones. Special equipment for rayon cord.

MODEL 35A WINDER—for winding coarser yarns to 8" traverse knitting cones.

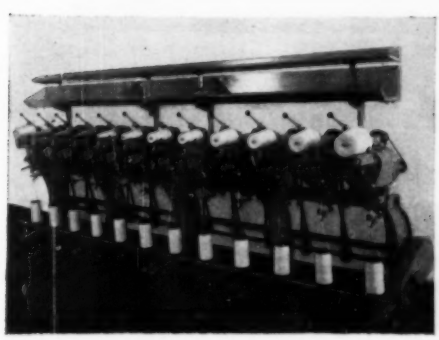
MAGAZINE CONE WARP CREEL—for high speed beaming, half warping or jack spooling of all types of yarns. Built to hold 6", 7" or 8" traverse wood or paper cones. Electric stop motion, if desired.

FOSTER-MUSCHAMP AUTOFILL WINDER—For the automatic winding of all types of staple and filament yarns to shuttle bobbins. Winding speeds up to 6,000 r.p.m. Bulletin M-1 on request.

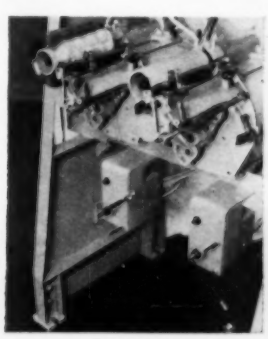
FOSTER-MUSCHAMP AUTO-BRAID—A fully automatic high speed braider bobbin winder. Spindle speeds up to 5,000 r.p.m. for parallel wound braider or similar bobbins.

FOSTER-MUSCHAMP AUTOQUILL—A versatile, fully automatic machine for winding any type of yarn on quills—with straight or oblique sides.

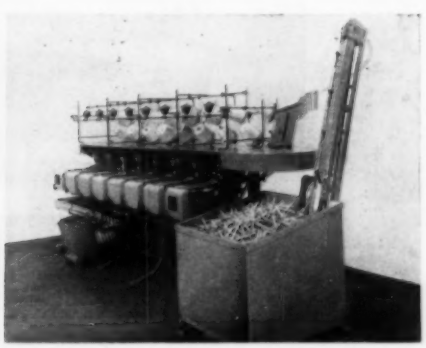
FOSTER-MUSCHAMP AUTO-THREAD—For precision winding of all sizes of sewing thread spools with high production—low maintenance. Fully automatic.



MODEL 77 PRECISE WINDER



TENSIOMATIC WINDER

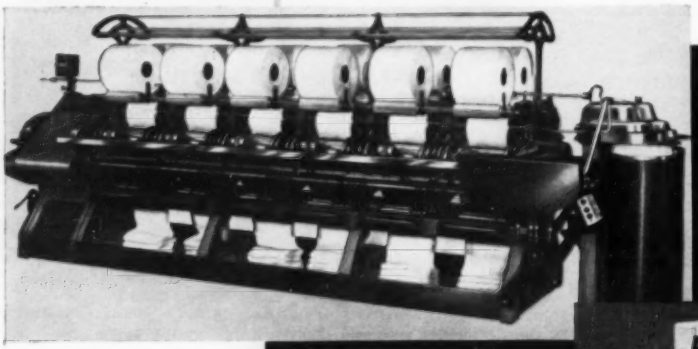


MODEL 66 AUTOMATIC FILLING WINDER

For performance, quality and operating economy

Specify SACO-LOWELL

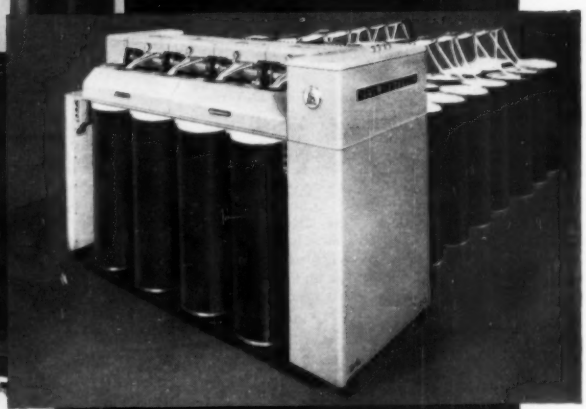
THE MOST MODERN TEXTILE MACHINERY IN THE WORLD!



COMBERS

Producing up to 75 lbs. per hour for low noil and up to 60 lbs. per hour for quality combing. Combs cotton from ⅞" staple to the finest Egyptian with precise control of noil removal from 6% to 25% depending on cotton being processed.

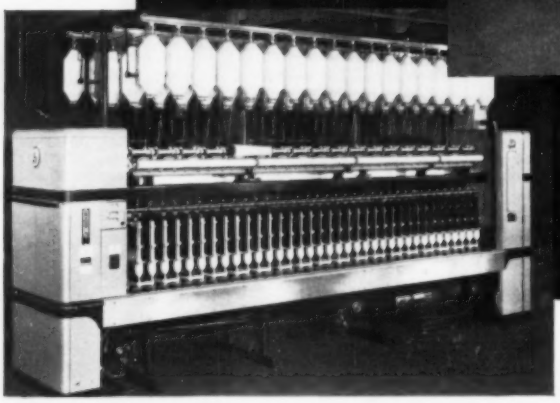
Saco-Lowell combers are double sided allowing independent operation of each side with six doublings per side.



VERSAMATIC DRAWING FRAMES

For highest production of quality sliver by every standard—

per delivery
per man hour
per horsepower
per sq. ft. of floorspace



NEW S J SPINNING FRAMES

High speed, large package frames which produce better quality, stronger, more even yarn. Unsurpassed production rates with low maintenance expense give unequalled economic advantages.

SEND FOR COMPLETE CATALOG ABOUT THESE PROFIT MAKING MACHINES

THE STANDARD OF QUALITY AND PERFORMANCE Since 1813

SACO-LOWELL TEXTILE MACHINERY DIVISION

SACO-LOWELL SHOPS

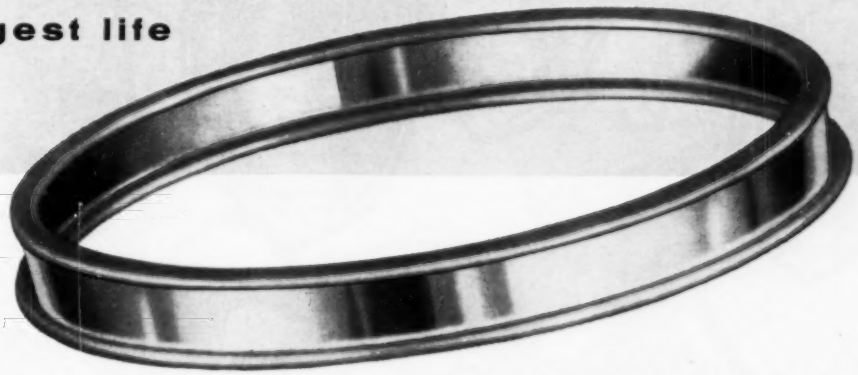
Executive & Sales Offices — EASLEY, S. C.

Branch Sales Offices — ATLANTA, GA., BOSTON, MASS., CHARLOTTE & GREENSBORO, N. C. & GREENVILLE, S. C.

ONLY SACO-LOWELL HAS THE PERFECT COMBINATION!

Speed-Tex RINGS

give the shortest breaking-in period, highest traveler speeds and longest life

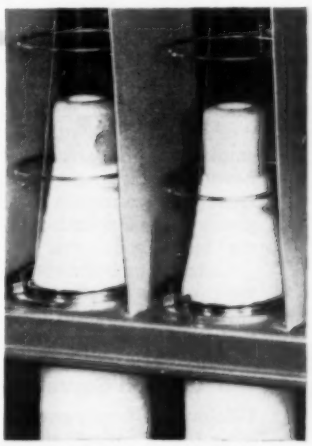


In leading mills, Speed-Tex Rings have reduced breaking-in periods from as many as 100 traveler changes to as few as 5 or 6. This is the result of a new metallic surface alloy. This alloy, because it is applied at low temperatures, does not soften the initial case hardness of the basic steel ring as usually occurs when special finishes are applied to other makes of rings. As the traveler alters the Speed-Tex finish, which becomes invisible after a short time, traces of the alloy in the traveler path give Speed-Tex Rings shortest break-in period and longest life of any ring available. There's "no other ring like it."

VICTOR TRAVELERS...

set the highest standards of traveler performance

New, modern facilities are used to test and inspect the metal, the shape, the weight, the temper and the finish of Victor travelers. This assures highest quality and uniformity. Victor has always been, will always be, your best buy — "*A right traveler for every job.*"



REMEMBER, **ONLY SACO-LOWELL HAS "PERFECTLY MATCHED" RING AND TRAVELER COMBINATIONS**

THE STANDARD OF QUALITY AND PERFORMANCE Since 1813

SACO-LOWELL REPLACEMENT PARTS DIVISION
SACO-LOWELL SHOPS
Executive and Sales Offices — GREENVILLE, S.C.
District Sales Offices — ATLANTA, GA., CHARLOTTE AND GREENSBORO, N.C.

CLINTON
can do it with CORN

destination?

a candy bar or a wonder drug

Clinton Products go into the making of many good things. Yours?

It has been said, "Wherever you may be and whatever you touch, one or more products of corn enter into its manufacture." The fabric from which your shirt is made was woven with the aid of starch. Starch gave it the fine finish at the laundry. The cigarette you smoke, the magazine you read, the food you eat, the beverage you drink—yes, the candy with which you treat your youngster or the antibiotic in your doctor's prescription depended in some way on a product that was made from corn.

Corn is our business at Clinton. In our modern plant we produce the finest of products from corn—under the strictest system of quality control. And, Clinton research *today* improves *tomorrow's* product for you.

Clinton Serves the TEXTILE Industry

Clinton's uniformly controlled, quality products will meet your textile manufacturing requirements. Consult your Clinton salesman. He will provide product information, arrange for prompt technical service, or assist you in any way possible.

CLINTON CORN PROCESSING COMPANY
CLINTON, IOWA

CORN SYRUPS
DEXTROSE • STARCHES • DEXTRINS
SUGARS • OILS • LACTIC ACID
AND OTHER PRODUCTS FROM CORN

CLINTON

If you can do it with CORN you can do it better with CLINTON

next time...

WHYDONTCHACALL
Louis P. Batson

When time is important . . . when you need supplies "yesterday," when you must meet that impossible schedule . . . call us. We'd like an opportunity to show you what we can do . . . the kind of service you can expect from Louis P. Batson Company. CALL US COLLECT the number is Greenville CE 2-7691.

You'll get fast service!

LOUIS P. BATSON *Company*

P. O. Box 772
GREENVILLE, S. C.

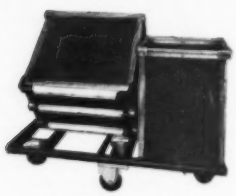
THESE ARE ALWAYS "ON THE SHELF" READY FOR IMMEDIATE DELIVERY: • ShuR-CusH vibration pads • ShuR-TufF harness strapping • woven felts • felt cut parts • ShuR-TufF wirecenter harness cords • hookless harness adjustors • dobby and gem head stirrups, loops, jackeyes • positive adjustment jack sticks and parts • neva wear case hardened jack hooks • turnbuckle harness adjustors and regulators • adhesives and cements • sheaves • static eliminators • hand dryers • laminated picker sticks, sweep sticks, power adjustors • pickers, check straps, belting • temple rolls, shell rolls, beam barrels • shuttle fur • clear plastic for loom aprons, covers, dividers • leece rods, warp clamps, loom flags • castings • aluminum, brass • mats and matting • fancies or fancy rolls for cards • jacquard twine and neck cord • set mark preventors for looms • harness connectors • fibre, fabric, leather • bumpers • yarn tinting devices for looms and quillers • ShuR-TufF lug straps • shuttle and bobbin protectors • time clocks, watchmen clocks • shuttle pegs and bristles • oilless bushings • lug hold ups • take up roll covering • harness and leader wires • "C" hooks and "S" hooks

THE NATIONAL SCENE

MATERIALS HANDLING EQUIPMENT
KENNETT
NATIONAL VULCANIZED FIBRE CO.
Wilmington, Delaware

ROVING CANS

STANDARD TRUCKS



DOFFING TRUCKS

MILL BOXES

NESTING-STACKING TRAYS

36 page catalog free on request

in TEXTILES...

no other type of container handles materials so surely . . . or so gently!

Kennett Receptacles are unsurpassed for safe, sure, clatter-free handling of delicate yarns, fabrics and finished garments. They're made of National Vulcanized Fibre, a material amazingly light, tough, smooth, durable.

If you don't know these standbys of the textile field, it will pay you to check into them now (whatever your materials handling problem). Kennett Receptacles are made of National Vulcanized Fibre . . . not a paper, but a chemically-made fibre that is one of the strongest materials per unit of weight that ever went into a container.

Kennett Receptacles can be slammed, banged, stacked, knocked and abused in mills, warehouses, stores, stockrooms and on production lines and they'll come back for more. Vulcanized Fibre won't split, crack, dent, crush, crumple, blister or rust. It's strong, yet so amazingly sleek, resilient and shock-absorbing that Kennett Receptacles are the choice for safe handling of delicate materials, components and products in almost every industry.

There is a full line of sizes and types: roving cans, trays, tote boxes, barrels, cases and multi-purpose trucks available, even in a fire-resistant fibre if you wish. Or, name your special requirement and Kennett can provide it.

Write direct to Dept. BB-7 today for our comprehensive booklet. If you'll name the use you have in mind, we'll be glad to tell you specifically how we can help.

NATIONAL VULCANIZED FIBRE CO., Wilmington 99, Del.

In Canada: **NATIONAL FIBRE CO. OF CANADA, LTD., Toronto 3, Ontario**

See Page 86 for Lestershire Spools and Bobbins

COST SAVING NEWS FROM THE SPEIZMAN GROUP OF COMPANIES

O·N·E S·T·O·C·K·I·N·G

E·V·E·R·Y T·E·N

M·I·N·U·T·E·S

Hit top speed with the Carolina K2F two-feed ladies seamless hosiery knitter—not a prima donna, but the workhorse of the trade. Use with conventional or stretch (S & Z twist) yarns. In 3½ inch or 3¾ inch diameters up to 500 needles. Attachments include bottom looping line, "Getaz" toe, tucking, or graduated stitch, Y-heel, electric stop motion and Southern Slow Down. Automatic takeups if desired. Only the finest parts and materials are used in manufacturing this mill tested **K2F.**

C·A·R·O·L·I·N·A K·N·I·T·T·I·N·G M·A·C·H·I·N·E C·O·R·P·O·R·A·T·I·O·N

508-14 WEST 5th STREET • CHARLOTTE 1, NORTH CAROLINA • ED 4-5546

CIRCLE 71 ON READER SERVICE CARD 71

Bahnson AIR-O-MATION FOR 1959

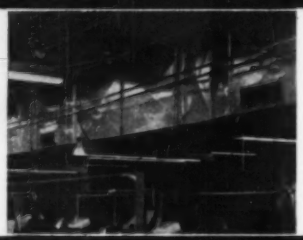
AIR AT WORK FOR INCREASED PROFITS

CONDITIONS • CLEANS • COLLECTS • CONVEYS

AIR CONDITIONING

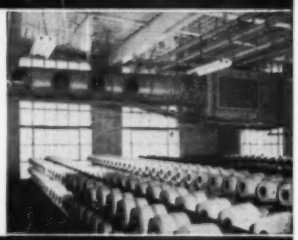
CENTRAL STATION SYSTEMS

Custom designed and built to your individual plant requirements with cooling by evaporation or refrigeration and complete with Bahnson engineered and manufactured components such as Type Y Air Washer, controls, grilles, dampers, automatic suction strainers and lint filters. Bulletin 22A has full information.



HUMIDUCT UNIT SYSTEMS

Flexible unit system of Bahnson design. Provides all or any combination of textile air conditioning functions including cooling by evaporation or with refrigeration. Humiducts are self-contained and light enough in weight to be ceiling suspended, eliminating costly apparatus rooms and structural changes. Bulletin 4A contains complete details.



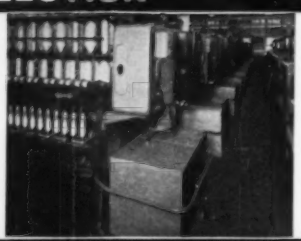
VACUUM COLLECTION

COLLECTO-VAC

Automatically collects broken ends, lint, fly on spinning frames. More uniform suction pressure the length of frame at lower horsepower. Anodized aluminum flutes do not warp or crack. Scroll type fan discharge disperses motor alley heat. Bulletin 30A has details.

Central Heat Removal System

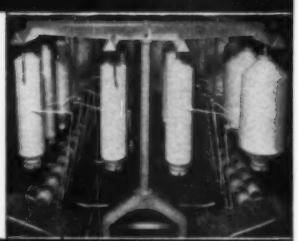
Takes out heat from collection units, motor alley, lowers room heat load. Can be added to existing collection systems.



CREELS

OPEN AIRE CREEL

Open creel design, enamel finished with specially constructed, factory assembled steel supports and crossarms. Crossarms are notched for greater lateral strength. Bahnson-designed weight wire positioners keep weights in correct operating position at all times. Open Aire Creel furnished also with new spinning machinery purchases upon request.



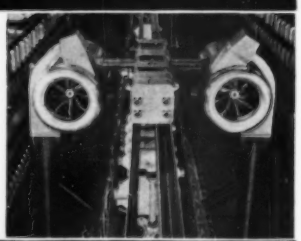
CLEANING

AERO-SWEEP CLEANER

Automatic oscillating traveling cleaner self-propelled along single ceiling suspended track. Cleaner blows perpendicular to track delivering head-on air blasts for more effective overhead cleaning of ceiling, beams, lights and piping. Has patented index feature for cleaning predetermined pattern. Write for Bulletin 21A.

CROSS JET CLEANER

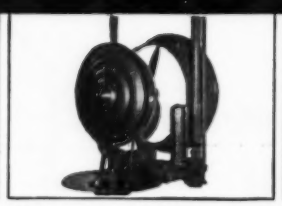
New cleaning principle with fixed and oscillating air discharge nozzles. The Cross Jet is self-propelled and operates on single rail creel-mounted track. Cleans entire frame, as well as walls, ceilings, beams, lights, etc.



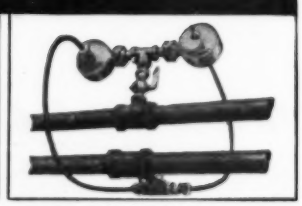
HUMIDIFICATION

Bahnson makes the world's most complete line of industrial humidification equipment. A type for every need is available of which only three models are shown. Whether for small rooms, large areas, or for supplementary evaporation, Bahnson designs and manufactures the best and most economical system to solve your humidification problem. Catalog Section 104 details complete line.

TYPE E



TYPE H



TYPE ESC ATOMIZERS

FOR DYERS AND FINISHERS

Bahnson can supply complete ventilation, exhaust and vapor absorption systems designed to fit specific requirements for Dyeing and Finishing operations.

91 of the top 100

textile manufacturing firms in the nation are users of Bahnson equipment!

Bahnson COMPANY
WINSTON-SALEM, N. C., U. S. A.

PREPARATORY

Bale Breaker Feeds
Oiling Systems
Pickers
Shredders
Condensers
Stock Conveying Systems
Willows

BLENDING

Automatic Blending Systems
Blending Feeds
Patented Roller Distributor

YOU'LL FIND

PROCTOR EQUIPMENT

ON-THE-JOB FROM FIBER TO FABRIC

For more than 75 years, PROCTOR has held the leadership in the manufacture of dependable textile machinery. PROCTOR's advances in ever-new, ever-improved equipment have been prominent in an ever-expanding industry. In the processing of print goods, knit goods, tufted and woven carpets, non-woven fabrics, natural and synthetic fibers . . . you'll find the name PROCTOR on equipment used in these all important textile operations.

CARDING

Synthetic Cards
Woolen Cards
Worsted Cards
Jute Waste Cards
Non-woven Web Forming Equipment
Card Feeds
Intermediate Feeds
Can Coilers
Balling Heads
Garnetts—Batt & Reprocessed Fiber
Automatic Batt Making Systems
Bi-Temp Metallic Wire

FINISHING

Con-o-matic Washers
Open-width Continuous Bleach Ranges
Continuous Bleach Ranges for Tubular Knit
Tenter Housings
Multi-pass Air-lay Dryers
Nylon Setters
Equipment for Redmanized® "Shrunk-to-fit" Fabrics
Hosiery Tray Dryers
Loop Dryer-Curers
Roller Dryer-Curers
Squeeze Rolls
Stock Dryers
Slasher Dryers
Yarn Dryers
Non-woven Fabric Dryers & Curers
Carpet Dryers
Agers

Investigate the advantages of PROCTOR equipment in your process. Consult a PROCTOR engineer, trained and experienced in all phases of natural and synthetic textile processing.

Proctor®

PROCTOR & SCHWARTZ, INC.

PHILADELPHIA 20, PA.

CIRCLE 73 ON READER SERVICE CARD 73

NATIONAL RING TRAVELER CO.

AND STERLING DIVISION

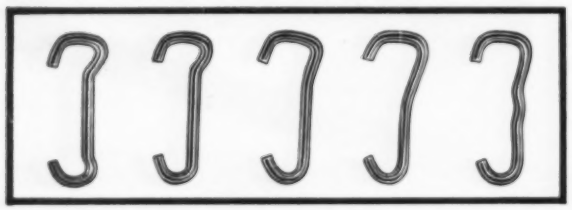
MAIN OFFICE AND PLANT
354 Pine St., Pawtucket, R. I.
F. L. Chase, Jr., Pres. and Treas.

EXPORT AGENT
A. M. Romero Corp.
350 Fifth Ave., New York 1, N. Y.

SOUTHERN OFFICE AND WAREHOUSE
P. O. Box 293, Gaffney, S. C.
L. Everett Taylor, So. Mgr.

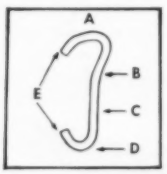
SOUTHERN SALES ENGINEERS
H. B. Askew, P. O. Box 424, Griffin, Ga.
T. Hill Ballard, 112 N. 9th St., Belmont, N. C.
Frank S. Beacham, P. O. Box 511, Honea Path, S. C.

There's a National-Sterling Traveler for Every Need



VERTICAL TWISTER TRAVELERS
BRONZE, PHOSPHOR BRONZE, STEEL

To fit 5/16", 3/8", 7/16", 1/2", 5/8", 21/32", 43/64", 11/16", 3/4", 1", 1 1/16", 1 1/4" depth vertical rings



A Head
B Break
C Back
D Heel
E Horns

FOR BEST RESULTS these Travelers are made to fit the rings on which they are to run.

THE HORNS are made long enough to hold the Traveler on the ring, but not so long that the Traveler is bent out of shape when being put on the ring, nor must the HORNS come in contact with the rail or holder when in motion.

THE HEAD must be large enough for the yarn and knots to pass thru freely and must also balance the Traveler so that it will run in a correct position.

THE BREAK in the BACK depends on the type of ring and also affects the position in which the Traveler will run.

THE HEEL must be made to the thickness of the ring and allow for freedom in running.
Made of round, oval or flat wire.
Flat Oval — Wire that is flattened slightly on the oval.
Combination Ellipse Duplex
Ellipse rolled wire in head where yarn runs and flat wire at back and heel at point of contact with the ring.

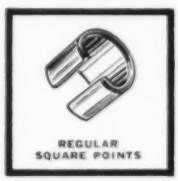
Whatever fibers you are running — cottons, wools, synthetics, or blends — it will pay you to use National-Sterling Travelers. When ordering, send sample of Traveler you are now using and, if possible, give diameter and flange of horizontal rings — diameter and depth of vertical rings.

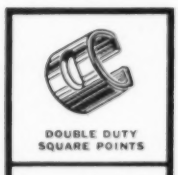
ROUND POINT TRAVELERS
Regular, Narrow & Wide Style

For Flange 1 rings:
Circles 1/2, 9/16, 5/8, 3/4, 1, A-1, 1 1/2, 2
For Flange 2 rings:
Circles 3/4, 7/8, 1, A-1, 1 1/2, 2, 3, 4, 5, 6
For Flange 3 rings:
Circles 2, 3, 4, 5, 6

SQUARE POINT TRAVELERS
Regular, Wide & Narrow Style

*For Flange O rings:
Circles 1/4, 3/8, 1/2
For Flange 1 rings:
Circles 1/2, 9/16, 5/8, 3/4, 7/8, 1, A-1, 1 1/2, 2, 3
For Flange 2 rings:
Circles 3/4, 7/8, 1, A-1, 1 1/2, 2, 3, 4, 5, 6, 7
For Flange 3 rings:
Circles 3, 4, 5, 6, 7, 8

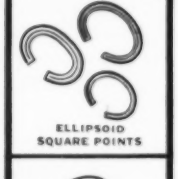




SPECIAL STYLES OF TRAVELERS
For special work or conditions

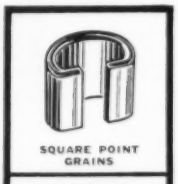
Round Wire
Oval Wire
Combination Ellipse Duplex Horns
*Ellipsoid
*Bal-Ellipsoid
E. C. Lowboy
Flat Top
(For high speed spinning)
Double Duty
Gravity
Gravity Express
Etartnep Finish
Special Finish for longer life

Most of these styles can be supplied in either Round or Square Points for Flanges 1, 2, & 3.



STEEL GRAIN TRAVELERS
Square and Round Points

For Dry Twisting on Horizontal Rings
Wide, Regular & Double Duty Style
For Flanges 2, 3, 4, 5, 6, 7, 8, 9, 10
Circles to fit rings & conditions
Flat, Oval & Round Wire



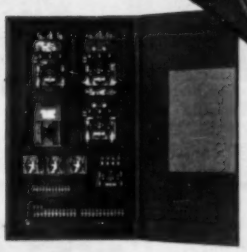
The only machine in the world making NON-WOVEN FABRICS that:

EXCLUSIVE 1 Produces uniformly thick webs to the very edge . . . full 84 inches.

EXCLUSIVE 2 Uses natural or synthetic fibers from ¼" to 2" with weights from ½ oz. to 20 oz. per sq. yard.

EXCLUSIVE 3 Delivers high production with low maintenance.

NEW, IMPROVED 84" RANDO-FEEDER® AND RANDO-WEBBER®



1 ELECTRICAL CONTROL PANEL
May be used in centralized electrical distribution system

2 LARGE DOORS EACH SIDE
Easy access for servicing

3 ACCESSIBLE CONTROLS
For all phases of machine operation

4 SIDE DOOR TO FEEDER

5 DUAL AIR VALVES
Controls for delivering uniform fiber distribution with indicating suction gauges 5A

6 FULLY GUARDED

7 FEEDER ON ROLLER BEARING WHEELS AND RAILS
For easy separation of units

8 TOP DUCT COVER
Clear Plexiglas window . . . a lightweight window for observing web formation

9 FINGER TIP ADJUSTMENT OF TOP DUCT COVER
For passage of any thickness of RANDO-WEB®

10 REMOVABLE PANEL
For easy access to fans

PLUS BUILT-IN HUMIDIFICATION SYSTEM, IMPROVED FEED ROLL AND FEED PLATE ASSEMBLY for automatic threading of feed mat.

TEXTILE DIVISION
CURLATOR®
CORPORATION
EAST ROCHESTER, NEW YORK

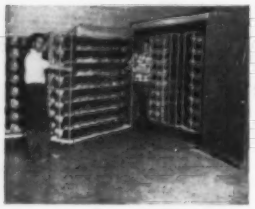
WRITE for bulletin giving more detailed information on fibers used, webs made, end products.

EXPORT REPRESENTATIVE: Lendt & Company, 535 Fifth Ave., New York 17, N.Y.
SOUTHERN REPRESENTATIVE: Parrott & Ballentine
3440 Augusta Road, Greenville, S. C.

Trademark Reg. U. S. Pat. Off.

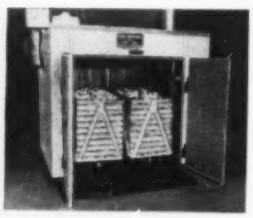
"H-W" Fully-Automatic CONDITIONER

for... **CONDITIONING and TWIST-SETTING OF COTTON, SYNTHETICS, WORSTEDS, WOOLEN, SILK, ALL COMBINATION YARNS, and NYLON HOSIERY**



"H-W" Conditioner for Lofting and Regain Cotton Knitting Yarn.

"H-W" Conditioner for NYLON YARN handled on trucks.



"H-W" Conditioner for COTTON. Yarn is handled in slatted wooden truck.

"H-W" Conditioner for high temperature, arranged to automatically preheat, condition and exhaust.

THE "H-W" CONDITIONER

The "H-W" Conditioner is adapted to handle efficiently silk, synthetics, cotton, woolen, and worsted yarn on spools, bobbins, shafts, cones, tubes or quills. This machine maintains any desired temperature and humidity. The air is saturated with moisture, and yet there are no particles of moisture floating around to be deposited on the material. Moisture is in the form of water vapor, which has the ability to penetrate all the air channels in the material, because water vapor and air, each a different gas, can both occupy the same space at the same time without one displacing the other.

Advantages . . .

- Relative humidity, temperature and time of operation are automatically controlled.
- There is no condensation on the ceiling of the Conditioner, and consequently no danger of drops of hot water falling on the material.
- Penetration is uniform so that all the material will receive the same treatment.
- Conditioned air is delivered at temperatures which are best for the yarn. There is no yellowing of woolen yarn due to over steaming. Shrinkage is more uniform giving better results in dyeing and no loom stoppage due to wild and kinky filling yarn.

COMPLETE EQUIPMENT

"H-W" Conditioners are furnished with complete automatic controls and permanent record of operating time, temperature and humidity. The interior is lined with Monel metal or stainless steel over a welded steel frame, insulated with Fiberglas, while the outer covering consists of a board made up of asbestos fiber and Portland cement, so that both the inside and outside are rust proof. The floor is a solid piece of nickel-clad steel, requiring no tracks. It can be furnished with steam coils or electric heating elements and is more economical in operation than any other known method of twist setting. It is built in many different sizes to meet all mill conditions.

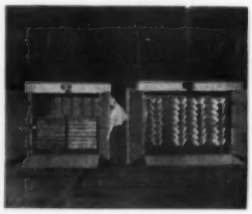
SPECIAL FEATURES

Conditioners can also be arranged to automatically preheat, condition, and exhaust or dry at the end of the conditioning period. Special conditioners are available for dry bulb temperatures up to 300° F.

FOR COMPLETE INFORMATION WRITE FOR BULLETIN U. C.

PATENTS:

"H-W" equipment described herein is protected by the following United States Letters Patents: 1,564,566; 1,605,633; 1,605,634; 1,667,315; 1,815,669; 1,853,419; 1,853,421; 1,853,422; 1,853,423; 1,853,424; 1,919,107; 1,951,281; 1,961,606; 1,968,764; 1,971,405; 1,972,772; 1,975,717 and 2,606,372.



"H-W" Conditioner for WORSTED YARN on bobbins and cones.

"H-W" Conditioner for Regain.

"H-W" Conditioner for WOOLEN and WORSTEDS. Canvas baskets are used in conditioner.

"H-W" Conditioner for Nylon Hosiery—96 doz. pr. capacity. Write for Bulletin H1: "H-W" Conditioner for Nylon Hosiery.

THE INDUSTRIAL DRYER CORP. STAMFORD CONNECTICUT

Sales Representatives in Key Textile Areas

For automatic weaving

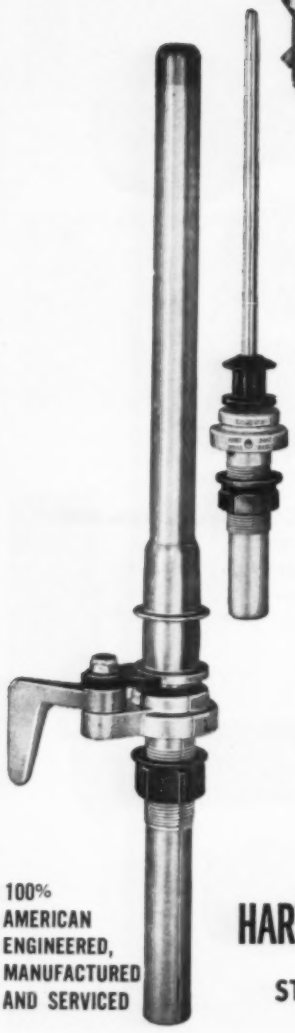
for all types of looms, for all types of stop motion, made of different types of hardwood, and with various varnished finishes, suitable for every requirement.

EMIL ADOLFF Reutlingen/Wttbg., Germany

U.S.A. Central Organization—Textube Corporation, 695 Summer St., Stamford, Conn.

Sub-Agents for the South:
Watson & Desmond, 220 West Fourth Street, Charlotte, N. C.

Sub-Agents for Canada:
Crowther Limited, 212-214 Victoria Ave. Westmount, Montreal, P.Q.



Complementing each other

HARTFORD

- Autolatching Bobbin Hanger accommodates from 8 x 4 to 12 x 7

HARTFORD

- Improved Top Drive Filling Spindle

with 25/32" whorl for higher speed — more pounds of yarn. Acorn eliminated to increase cleaning time cycle.

HARTFORD

- Ball Bearing Warp Spindles— for Paper Tube or Wood Bobbin

100% AMERICAN ENGINEERED, MANUFACTURED AND SERVICED

HARTFORD-GREENVILLE DIVISION

STANDARD SCREW COMPANY

Box 1776 Greenville, S. C.

78 CIRCLE 78 ON READER SERVICE CARD

The EMBLEM OF QUALITY METAL SHIELDS

For Spools and Bobbins

Anderson Shields are dependable protection against chipping, splitting, and breaking of spools, bobbins, and paper caps. Even the most minute details are carefully worked out to make Anderson the highest in precision, the smoothest in finish, the best in performance. The Anderson Emblem is your assurance of the finest shields you can buy.

Insist on Anderson when you order metal shields regardless of where you buy spools and bobbins.

Regardless of shape or size if it's a Stamping

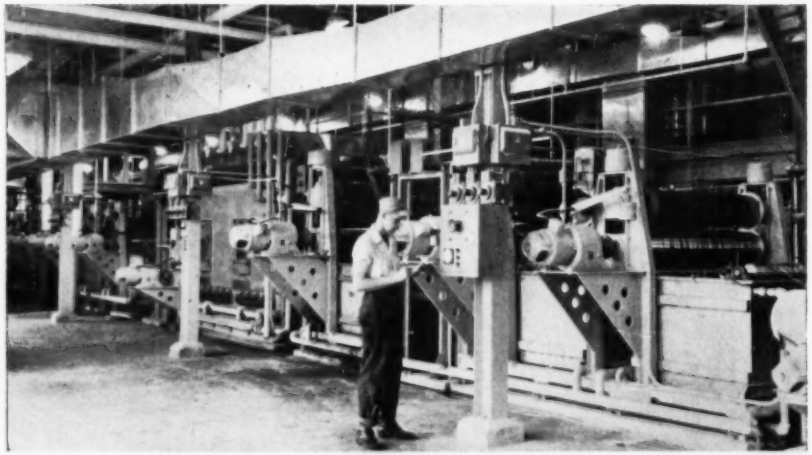
TEXTILE SHIELD CO., INC.

can make it

J. N. ANDERSON, Treasurer

LAWRENCE, MASS., U. S. A.

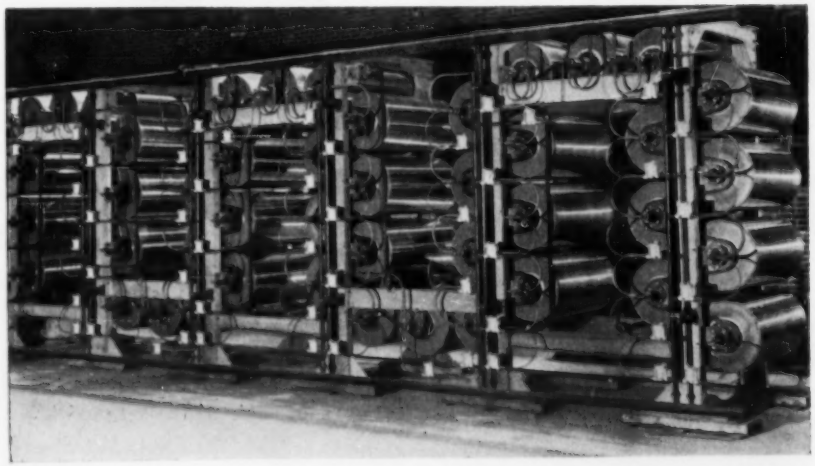
CIRCLE 258 ON READER SERVICE CARD



COMPLETE RANGES . . . for Dyeing, Finishing, etc. Custom built to users' special requirements . . of heavy, rugged construction for long, trouble-free life.

SLASHERS . . . high speed, multi-cylinder, all purpose slashers. Heavy rigid structural steel or cast iron frames.

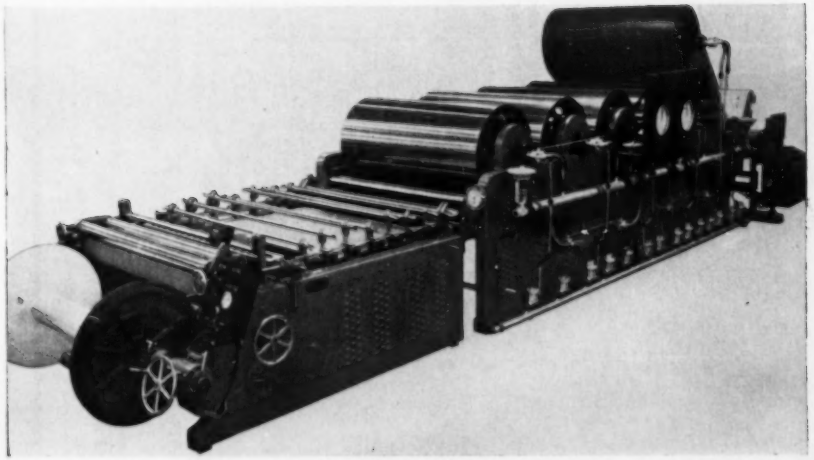
DRYING CYLINDERS . . . Custom designed machines to suit users' particular requirements, floor space, ceiling height, etc. Structural steel framework —stainless steel cylinders.



ADDITIONAL PRODUCTS:

- Progressive (Jig) Boil-Off Machines
- Two and Three Roll Manual and Automatic Batchers.
- Scrays.
- Convection (Hot Air) Dryers.
- Stainless Steel Hood & Exhaust Systems.
- Stainless Steel Dye Kettles.
- Vacuum Cleaning Systems for Spoolers, Warpers and Nappers.
- Padders and Mangles.
- Stationary & Magazine Creels.
- Open Width and Rope Washers.
- Steamers and Agers.
- Kettles—Tanks—Vats.
- Bond Dyeing Machines.
- Laboratory Machines.
- Vibra-Unit Washers.

. . . . SPECIAL MACHINES . . . .

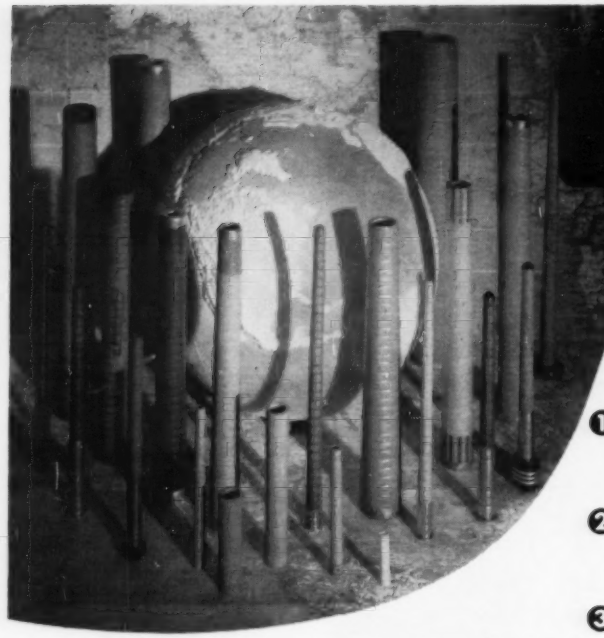


We invite your inquiries and will gladly furnish more complete information.

The South's Oldest & Largest Drying Cylinder and Stainless Steel Fabricators

The Textile Shops

SPARTANBURG, S. C.



A·P·T· BOBBINS
AROUND THE WORLD

U.S.A., Egypt, Korea, Belgian Congo, Brazil, Poland, Philippines, Mexico, Canada, Argentina, Colombia . . . A.P.T. bobbin PERFORMANCE commends them to world and U. S. mills.

Why Sales are Going Up . . .

1. We understand the problems inherent in increased spindle speeds, increased traverse lengths, increased diversification within mills, front roll speeds offering problems due to increased package sizes and spindle speeds.
2. The machinery manufacturers invite us to work with them in solving bobbin designs for custom made applications to arrive at optimum running conditions achieved with their new equipment.
3. A.P.T. research in our new plant has resulted in such improvements as . . . easy hand stripping . . . easy doffing . . . precision runout . . . increased life . . . controlled spooling and rewinding.

Accept Dependable Modern Bobbin Service

CONSULT THE NEAREST A. P. T. OFFICE

American Paper Tube Co.

ESTABLISHED 1898

Sales Offices . . . . . Greenville, S. C., Woonsocket, R. I.
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Canada: HUGH WILLIAMS & CO. LTD., 27 Wellington St., E. Toronto 1
Export Dept.:
A. M. ROMERO CORP., Empire State Bldg., 350 Fifth Ave., New York 1

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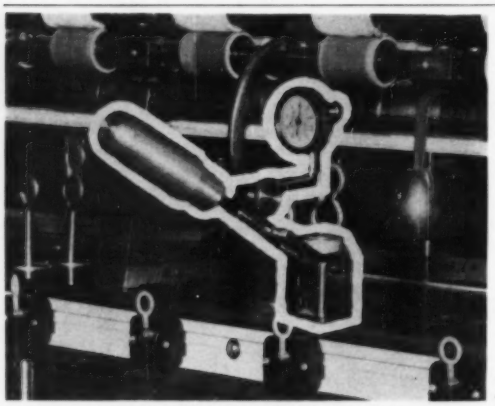


ROLL RUNOUT INDICATOR

TESTERS
FOR PRODUCTION QUALITY CONTROL RESEARCH

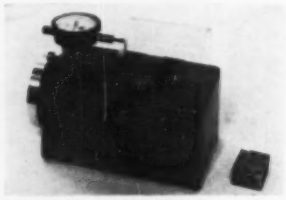
NEP TEST MACHINE

Standard laboratory testers for determining the durability and end-use performance of materials subjected to the effect of pilling, soiling, wearing and wrinkling. Used throughout the world. For other units see the Classified List Section or request our Catalog.

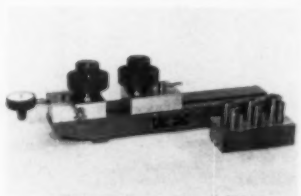
CUSTOM SCIENTIFIC INSTRUMENTS, INC.

541 Devon St. **Kearny, N. J.**

SURFACE ABRADER



TRAVELER HARDNESS TESTER



GEAR RUNOUT TESTER

FLEX TESTER

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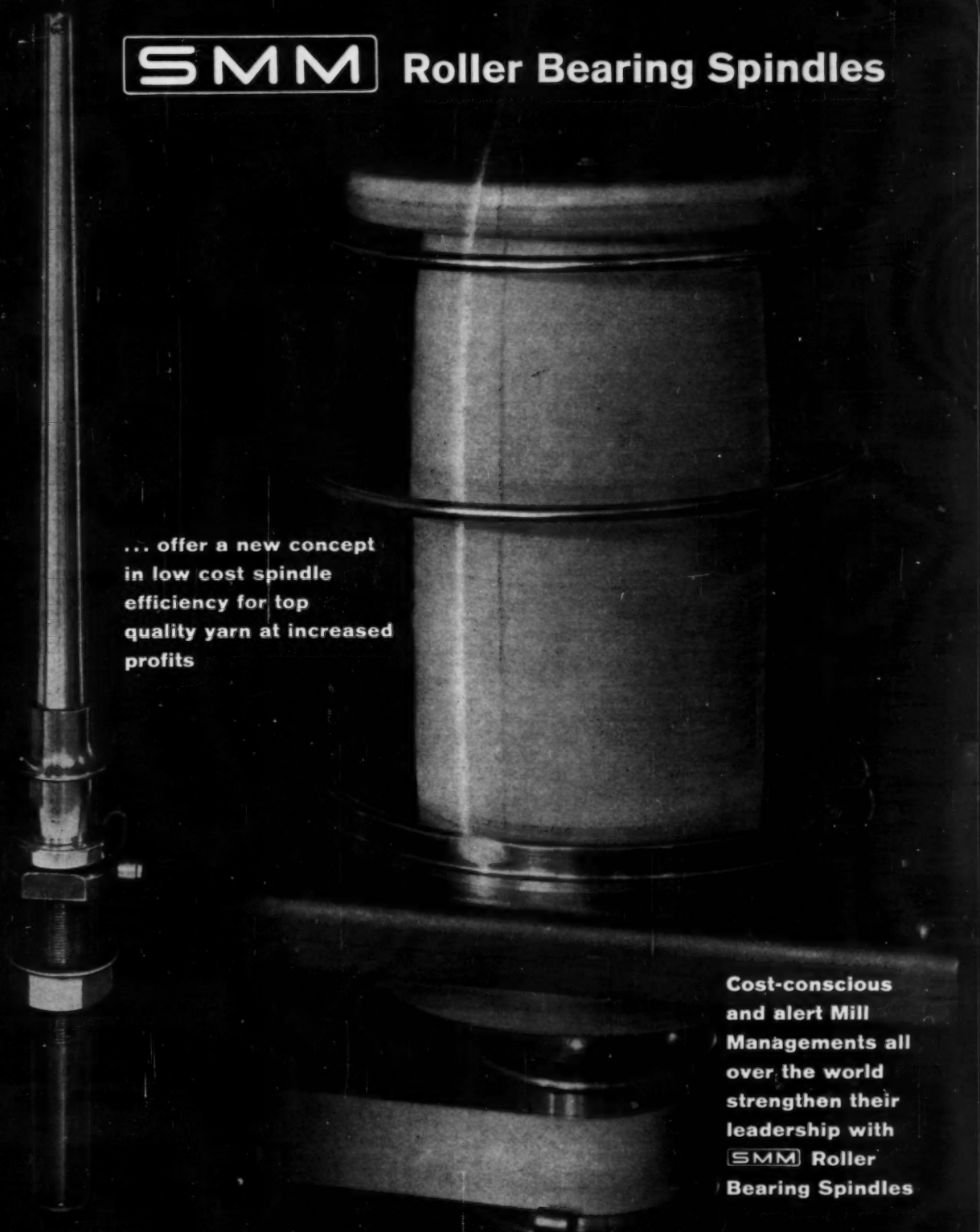
CIRCLE 81 ON READER SERVICE CARD→

SMM Roller Bearing Spindles



... offer a new concept in low cost spindle efficiency for top quality yarn at increased profits

Cost-conscious and alert Mill Managements all over the world strengthen their leadership with SMM Roller Bearing Spindles

Spindles, Motors & Machines Ltd., Uster
Switzerland

Representative for United States and Canada:

Gubelin International Corporation, Mount Kisco, N.Y.

Southern Representative: H. Phil Worth, Greenville, S.C.

NO selling gimmicks...

The same dependable kind of rings the industry has found *right* for the past century.

Our rings are carburized and nitrided at the same time. All over the U.S.A. they have hung up new records for long service. We have spinning and twisting rings you can't get from anybody else. Our engineering department will be glad to work with you on any problems.

Ragan Ring Co.

The oldest manufacturers of textile rings in the South

901 S. Main St., East Point, Ga.

CIRCLE 260 ON READER SERVICE CARD

QUALITY IMPROVEMENT ENGINEERS

Obsolete equipment and methods are two of the quickest and surest ways to put a pinch on profits. THOMASON'S engineers use scientific methods and equipment to help you improve your yarn quality and to control it in a practical way.

A THOMASON Quality Survey will tell you what your present quality is, what quality you should expect, and how to improve your quality at the least cost, a detailed report outlines results of equipment inspection; test results on raw fiber, laps, sliver, roving, and yarn; and specific defects with recommendations to improve your quality. Improved quality will mean definite savings in material and production costs and will increase your profits.

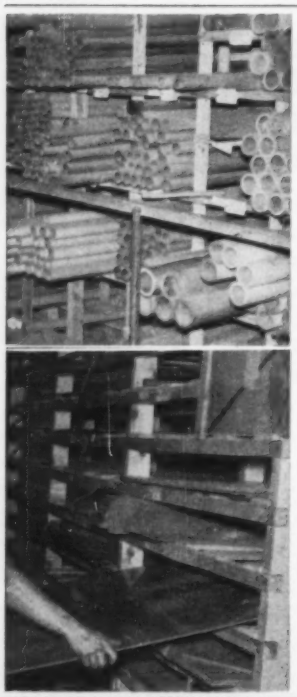
THOMASON Engineers are available for consultation with mills throughout the world in a trouble-shooting and surveying capacity. Write, call or wire for complete information on quality control retainer contracts.

W. A. THOMASON, JR.
—President

E. L. THOMASON
—Vice President

Thomason
TEXTILE SERVICE, INC.
2233 Greene Street
Charlotte 8, North Carolina
Telephone: EXpress 9-7494

CIRCLE 261 ON READER SERVICE CARD



Largest Diversified Plastic Stock in the South

EPI's large and diversified stock of plastic sheets, rods, and tubes assures immediate shipment of your order — and prompt fabrication of precision plastic parts and shapes.

Plexiglas®
Micarta®
Nylon
Acetate
Phenolite®
Teflon
Fiber
Polystyrene
Celeron®
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Plastic Bobbins, Caps, Accessories, and Machine Parts

EPI Plastic Bobbins have proven best in throwing and twisting tenacious yarns. Select materials, concentric construction, and the patented EPI lock ring assembly* resist the tremendous crushing strength of these materials. Dynamic balancing assures smooth running work at highest speeds.

EPI Plastic Bobbins are also becoming increasingly popular for cotton, rayon, and acetate. Dimensional stability, longer life, and smoother running at high speeds make them far superior to wood or fiber bobbins in performance and economy.

EPI manufactures a wide variety of tubes, caps, loom parts, specialties, etc. — in plastics and metals — for textile equipment.

*U. S. Patent 2,625,343

ENGINEERED Plastics INCORPORATED
123 Chase Street
Gibsonville, N. C.

SACM

Superbly Engineered Machinery to process worsteds synthetics & cottons

NEW COMPLETE MILL EQUIPMENT featuring --

NEW HIGH SPEED (PERL) COMB for worsted & synthetic fibres 1) 20% more production than any other French-type comb. 2) Runs at 175 nips per minute. 3) Suction System keeps work clean. 4) Extra-large can delivery. 5) Minimum floor space requirements. Agents for the PERL Comb in the U. S. A. & Canada: Atkinson, Haserick & Co., Framingham, Mass.

NEW HIGH SPEED (ER) DRAWING FRAME for cotton & synthetics 1) Two-head machine gives higher efficiency, easier settings and remarkable accuracy. 2) Positive guiding of sliver prevents any false draft. 3) Large feeding can means less piecings and handling. 4) Patented drafting systems gives speeds of 120 to 130 meters (130 to 140 yds.) per min. with no lapping, perfect regularity of sliver. Adjustable high-pressure system for all lengths of fibres up to 80mm (3⅛"). 5) Suction System gives cleaner operation. 6) All parts are easily accessible. Descriptive bulletin will be sent on request. In the U. S. A., write to: S. A. C. M., 3 Channing Place, Cambridge, Mass.

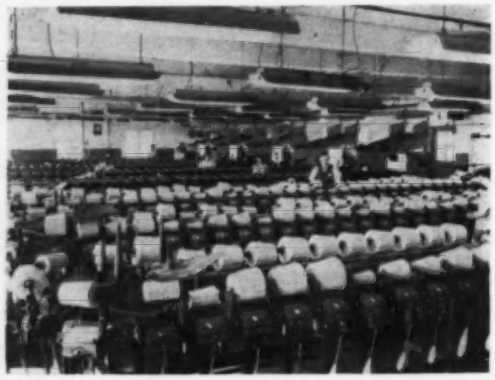
Société Alsacienne de Constructions Mécaniques
Mulhouse, France

CIRCLE 83 ON READER SERVICE CARD

ABBOTT MACHINE CO., Inc.

WILTON, NEW HAMPSHIRE

SOUTHERN SALES AND SERVICE: GREENVILLE, S. C.



AUTOMATIC CONE OR TUBE WINDERS—for winding all types of spun yarns on cones or tubes for Warping, Dyeing, Twisting, Quilling, Knitting or Sales Packages.

SPECIAL WINDING UNITS FOR KNITTING CONES—include a new slub catcher and a new waxing attachment, which uses standard size commercial wax disks.

LARGE PACKAGES—can be wound up to 11½ inches in diameter for use on shuttleless looms and looms that require a cone supply.

MODEL I AUTOMATIC QUILLER—for coarse count cotton, worsted, wool and other spun yarns, delivers full loom bobbins automatically into boxes, onto pinboards, on wide belt conveyor for inspection of bobbins, or into specially made magazines for automatic loom feeder.

MODEL II HIGH SPEED AUTOMATIC QUILLER (10,000 R.P.M.)—for winding fine count cotton and synthetic yarns of either spun or filament construction.

Also delivers full loom bobbins automatically into boxes, onto pinboards or wide belt conveyor for inspection of bobbins.

Under some conditions one operator can run two or three machines and produce upwards of 2500 full loom bobbins per hour.

ABBOTT FULLY AUTOMATIC RADIAL QUILLER, MODEL II—especially designed for flexibility, is very versatile and particularly well adapted for winding numerous small lots of filling.

Winds coarse or fine count cotton, worsted, wool, rubber and various synthetic yarns, either spun or filament.

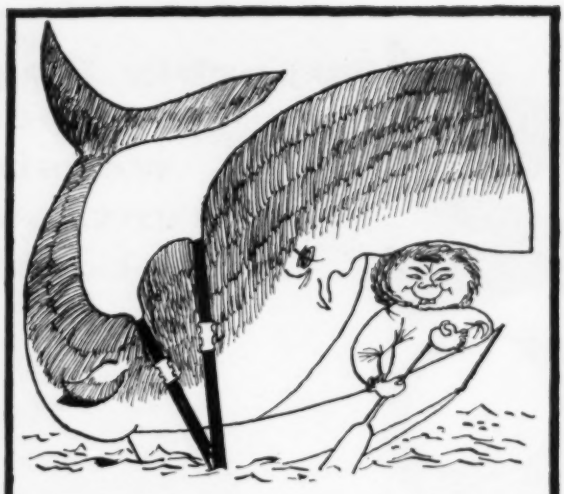
Automatic delivery of full loom bobbins onto pinboards, wide belt conveyor for inspection of bobbins, into baskets or other type containers.

Automatic delivery of bobbins can also be supplied whereby full loom bobbins from the individual cones and spindles are delivered into separate containers, which is highly desirable for loom finish yarns and the like.

The Radial Quiller can also be equipped with measured yardage attachments to give accurate, uniform bobbin yardage, as required for two-shuttle looms.

A wide range of spindle speeds from approximately 1000 R.P.M. to 10,000 R.P.M. is obtainable.

One operator can run several machines and thus produce up to 2000 loom bobbins, or more, per hour.



Bulky Shipments easily handled

ALLEGHENY *STEELBAND* **STRAPPING**

Look in the Yellow Pages for Name of your nearest Allegheny Strapping Distributor or PHONE or WRITE

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CIRCLE 262 ON READER SERVICE CARD

NORTH WATERFORD SPOOL COMPANY

NOWASCO

ESTABLISHED 1918

Manufacturers of

WOOD SPOOLS

AND

CORES

Post Office Box F, North Waterford, Maine

CIRCLE 263 ON READER SERVICE CARD

Economize With

MATERIALS HANDLING EQUIPMENT

by Fisher

Reduce bobbin handling with FISHER TRUCKS—made to doff—store—serve as trays for Barber Coleman Spooler—Roto-Coners—winders. INCREASE PRODUCTION & DECREASE HANDLING COSTS—Vulcanized fibre trucks—Galvanized and steel trucks—Lap trucks—Waste boxes—Aluminum and stainless steel trucks—Pin and cheese trucks. We alter designs to your specifications. Quotations furnished on request.

Serving the textile industry since 1945.

FISHER MANUFACTURING COMPANY

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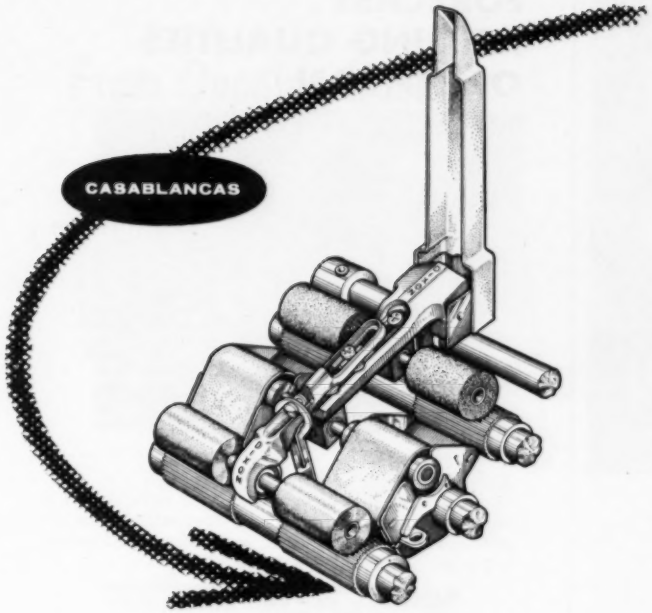
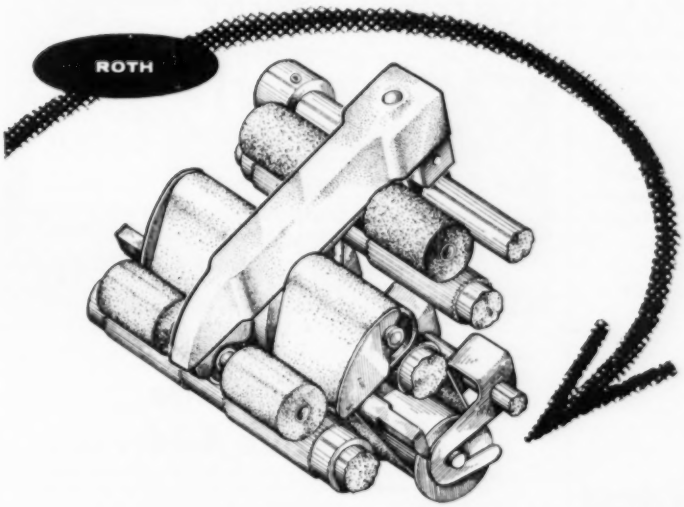


Only From Dixon!

ENGINEERED CHANGEOVER PLANS

for Both Spinning Systems



Dixon's multi-step changeovers for *both* Casablancas and Roth spinning systems are the product of over eighty years of specialized service to the textile industry. More than 2,000,000 spindles in leading mills* throughout the country attest to the dependability and high performance of Dixon-designed equipment.

If your spinning is outdated, a Dixon Engineered Changeover Plan is the most economical way to regain your competitive position in the industry. Dixon's broad product line and intimate knowledge of spinning technology make it possible for our engineers to recommend the system which will provide fastest pay-back in your mill . . . in terms of reduced cleaning, elimination of lubrication, fewer ends down, longer drafts, and better yarn uniformity. Furthermore, each Dixon Engineered Changeover Plan — whether Roth or Casablancas — can be installed in one or multiple low-cost steps. Mill profits improve RIGHT FROM THE FIRST STEP! When complete, the Dixon Plan provides the latest word in spinning efficiency:

- Middle and back rolls run on RULON® . . . the oil-free bearing that never is lubricated . . . outwears nylon 12 times.
- The Dixon patented self-aligning front roll rides on a hardened and ground, pre-lubed, sealed, precision ball bearing which is guaranteed for years and years and never requires lubrication.
- All parts are maintenance free. Pay-back on your investment is a matter of months.
- Productivity and quality improve. Yarn is cleaner . . . seconds decrease.

Want proof of performance? Ask our customers . . . also send for actual cost analysis of typical Dixon Changeover Plan which paid for itself in twenty-five months and is now saving $1.50 per spindle per year.

Dixon Corporation, Bristol, Rhode Island.
Southern Sales: Dunson & New, Inc., Box 9202 Greensboro, N. C.; Box 321 Greenville, S. C.; Box 445 West Point, Ga.

*To mention a few,

Mill	Spindles	System
Clifton Mfg. Co.	71,918	Double Apron Roth & Casablancas
Monroe Cotton Mills	18,756	Double Apron Casablancas
Columbus Mfg. Co.	17,000	Double Apron Roth
Crown Cotton Mills	15,232	Double Apron Roth & Casablancas
Deering Milliken	121,500	Double Apron Roth

Dixon

Engineered devices for weighting and guiding top rolls since 1876

Aluminum Take-Up Bobbin. Hard worker with a long life . . . takes crushing pressure of any yarn.

Lestershire Bobbins by NATIONAL

Wood and Fibre Twister Bobbins—Low cost—long life—for non-steaming use.

Rayon Twister Bobbins—Handle rayon or nylon at high speed, with steaming.

first choice of economy-wise mill men

Can your mill afford a full-time research program? Or even just one man to study nothing but bobbin problems? You won't need either when you use Lestershire Bobbins by National. Our research staff is working continually on your problems—new synthetic yarns, larger "packages," higher speeds—as they develop. You buy assurance when you buy Lestershire — assurance of the right bobbin for almost any spindle speed or yarn in use today.

Lestershire's program of research and development helps you in many ways. Quality control standards we've developed pay off in long, trouble-free bobbin and spindle life. Prices are realistic, too.

For prompt service, get in touch with your nearby National office or representative. In the South it's Odell Mill Supply Co., Greensboro, N. C.; Greenville Textile Supply Co., Greenville, S. C. Or write us at Dept. BB-7, Wilmington, Delaware.

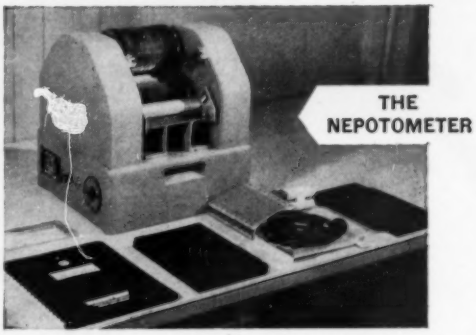
FOR KENNETT MATERIALS HANDLING RECEPTACLES SEE PAGE 70.

• • •

LESTERSHIRE PLANT
140 Baldwin Street
Johnson City, N. Y.

NATIONAL
VULCANIZED FIBRE CO.
WILMINGTON 99, DELAWARE
In Canada: National Fibre Company of Canada, Ltd. • Toronto 3
ALSO MANUFACTURERS OF NATIONAL VULCANIZED FIBRE, PHENOLITE LAMINATED PLASTIC, PEERLESS INSULATION, VUL-COT WASTEBASKETS
NEW DIMENSIONS IN DESIGN AND SERVICE TO THE TEXTILE INDUSTRY

FORECAST NEPPING QUALITIES OF COTTON



Developed at N. C. State College School of Textiles and on view there.

25 grain sample is processed in four minutes and is comparable to your standards of acceptable cotton for each quality of your yarns and fabrics. Literature and price on request.

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DIVISION OF SPERRY RAND CORPORATION
DURHAM, NORTH CAROLINA
CANADA: Sperry Gyroscope Ottawa Limited
P. O. Box 90, Ottawa, Ontario, Canada
Special Rep. for Nepotometer:
THE FRED S. WHITESIDE CORP.
10 High Street Boston 10, Mass.

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From Opening Room to Dyehouse

SARGENT EQUIPMENT

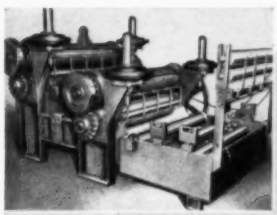
for ANY FIBRE - ANY BLEND

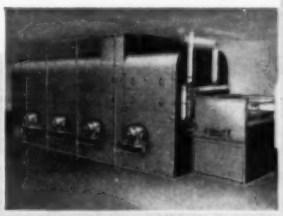
gives you
- NEW STANDARDS
- MODERN ENGINEERING
- PROVEN PERFORMANCE

One machine or complete systems, SARGENT textile machinery, with its rugged construction, economy of operation and highest standards of performance, helps mill men today to better quality work at substantial savings.

For all fibre-preparatory operations; for special yarn-handling equipment from yarn scouring and drying to yarn conditioners and balling machines and hankers; for conveyor and condenser systems; for specialized machines for many purposes,

SARGENT MACHINES *are the best workers in your mill.*

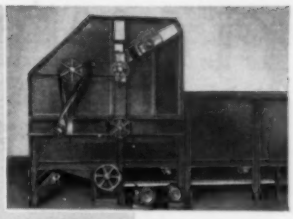




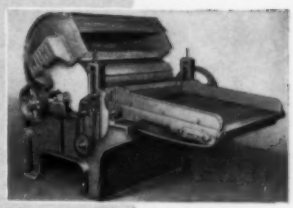
BACKWASHER and BACKWASH DRYER

For washing and drying sliver as it comes to the cards — for final washing of top before finisher gilling — for rinsing and setting of dyed top in ball form. The easiest of all backwashers for threading ends quickly — up to 48 three-ounce ends run through simultaneously — better than 700 pounds hourly production of card sliver — SARGENT design eliminates danger of broken ends at stopping and starting.

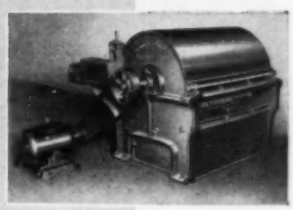
HEAVY DUTY OPENER
With Rotary Evener and Stripper. An exceptionally rugged machine For opening compacted dyed fibres, natural and synthetic, for better, more uniform drying —for opening heavy grease wools for better picking and cleaning.



WET AND DRY PICKER
As efficient for opening and picking synthetic staple as it is for wet cotton prior to drying — high production on all fibres. Highly popular in the absorbent cotton industry.

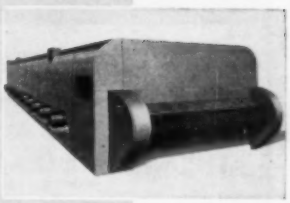


MIXING PICKER
Heavy duty, ideally adapted to continuous blending systems. Single or double pairs of feed rolls — adjustable nip—variable speed drives.



STAINLESS STEEL WASHER
Acid-resistant, stainless steel throughout. Ideal for scouring, bleaching, acidifying. May be equipped with side-settling tanks and lanolin recovery system.

STOCK DRYER
Single apron — the leader in modern dryer design and production. Rugged construction, down-draft air flow, automatic and continuous production.



AUTOMATIC FEED (Model N)
Hopper type, continuous, automatic — compact to conserve floor area. High production — thorough stripping action — easily adjustable evener comb either rotary or oscillating.

C. G. SARGENT'S SONS CORPORATION
Graniteville, SINCE 1852 Massachusetts

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CHICAGO 44 — John Law & Co., 5850 West Lake St.
DETROIT 27 — Clifford Armstrong Co., 16187 Grand River Ave.
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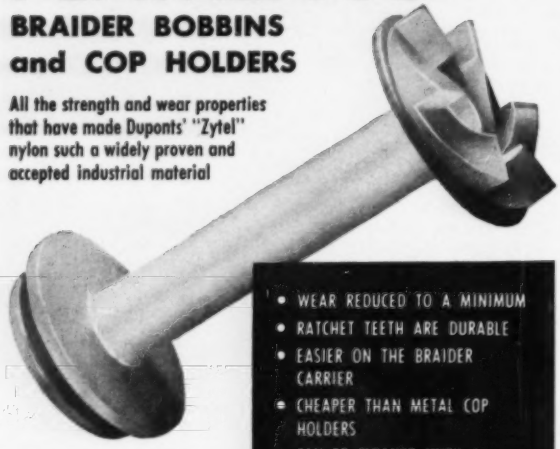
PLAMENCO

BRAIDER BOBBINS and COP HOLDERS

All the strength and wear properties that have made Duponts' "Zytel" nylon such a widely proven and accepted industrial material



- WEAR REDUCED TO A MINIMUM
- RATCHET TEETH ARE DURABLE
- EASIER ON THE BRAIDER CARRIER
- CHEAPER THAN METAL COP HOLDERS
- CAN BE CLEANED WITH A DETERGENT
- RESISTANT TO CRUSHING
- SELF LUBRICATING

SIZES FOR NOS. 1-2-3. N. E. BUTT CARRIERS AND MANY SPECIAL SIZES. SEND SAMPLE FOR QUOTATION.

SEND FOR PRICE LIST

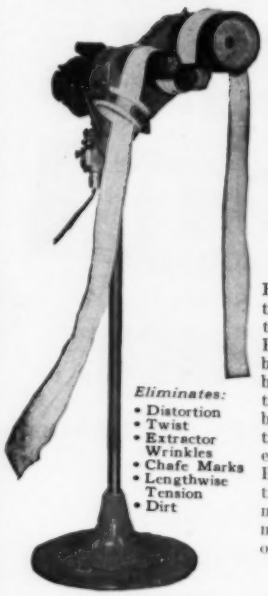
PLASTIC MOLD & ENGINEERING CO.

157 CLIFFORD STREET, PROVIDENCE 3, RHODE ISLAND

CIRCLE 267 ON READER SERVICE CARD

UTICA

EXTRACTOR LOADER AND UNLOADER for



Eliminates:
- Distortion
- Twist
- Extractor Wrinkles
- Chafe Marks
- Lengthwise Tension
- Dirt

- Sorting Wet or Dry Goods from one truck into various trucks as to classification.
- Loading Kiers and Tanks.
- Unloading Knitting Machines, Cans, and Piles.
- Conveying goods in the string from floor to floor.

HERE'S a machine that saves time loading, unloading, sorting and transferring goods—wet or dry. Precision made with sealed ball bearings throughout. Pedestal or bracket mounted. Electrically waterproofed. Head swings 360° on ball bearings and locks in any position. Motor, integral with drive, is easily detachable. Drive runs in oil. Pot Eye quickly adjustable. Check the features of this labor-saving machine and you'll see why it's the machine you can't afford to be without. *Write today!*

UTICA Novelty and Mill Specialty Co.

2145 DWYER AVE, UTICA 2, NEW YORK

Builders of Textile Machines Since 1903

CIRCLE 268 ON READER SERVICE CARD

PRODUCE BIGGER AND Better LAPS WITH EXISTING PICKERS

It is not necessary to install brand new machinery to produce top quality laps . . . laps of smaller diameters and greater weight.

THE *LONG* PNEUMATIC LAP CONTROL SYSTEM is the *only* automatic control device that delivers uniform pressure on laps forming on the calender stack rolls—from start-up to doffing! The LONG system may be applied to calender roll, fluted roll or both. It is fully protected by U. S. Pat. No. 2,871,519, other patents pending. Constant air pressure eliminates radical fluctuations common with deadweight systems. Waste at ends is greatly reduced. Equally effective on cotton and synthetics. Maintenance is reduced to minimum.

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Representatives in all major textile areas. Address foreign inquiries to PLATT BROS. (SALES) LTD. OLDHAM, ENGLAND

OTHER L&H PRODUCTS INCLUDE: LONG Pneumatic Sliver Lap Controls* L&H Pneumatic Pin Pullers* L&H Pneumatic Pressure Roll Controls* L&H Pneumatic Picker Clutch*

*Pat. Applied for

Since 1898

Dary Ring Travelers...

THE DARY RING TRAVELER CO.

TAUNTON, MASSACHUSETTS

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Nylaclad

PATENTED ®

NARROW FABRIC QUILLS

The nylon-aluminum combination that creates the strongest, longest-wearing quill ever presented to the industry.

CUTAWAY SECTION

OUTSIDE LENGTHS	FROM 1⅝" to 5⅞"
FLANGED DIAMETERS	FROM 1 3/16" to 1 13/16"
HUB OR BARREL DIAMETERS	5/16" - ⅜" - 7/16" ½" - ⅝"
BORE DIAMETERS	.125" - .136" - .187"
FLANGE THICKNESS	FROM .109" TO .312" IN VARIED CONTOURS.

- IVORY SMOOTH RIM FINISH
- DIMENSIONALLY UNIFORM
- DIMENSIONALLY STABLE
- SNAG RESISTANT
- IMPACT RESISTANT
- WEAR RESISTANT
- NICK RESISTANT
- CRACK RESISTANT
- ABRASION RESISTANT
- CORROSION RESISTANT
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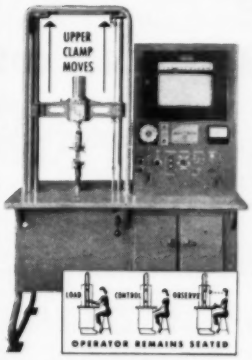
VERSATILITY in TENSILE TESTING

by ultra-precise Electronic Weighing

SIMPLIFIED OPERATION

LOW COST



CONSTANT RATE-OF EXTENSION

The Scott "CRE" Tensile Tester makes electronic testing practical for volume operation, because of unique design features which STABILIZE THE TESTING PROCESS. Built-in assurances of precision provide the most precise results by non-technical personnel with single control lever.

- **WIDE RANGE** of capacities from 0-0.05 lb. to 0-1,000 lbs. or 0-25 grams to 0-500 kgs.
- **UPWARD** crosshead travel up to 60" at infinitely variable speeds, with "Visual Time to Break" feature.
- **VERSATILITY** of autographic registration, to contour test curve for desired information.
- **OVER** 150 clamps and holding devices as needed to satisfy ASTM, ISO, Government and Industry Methods of Test.

REQUEST "CRE BROCHURE"

60 YEARS of Scott leadership is reflected in a comprehensive range of testers conforming to ASTM, ISO, Govt. & Industry methods.

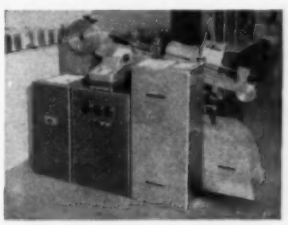
STATE YOUR PROBLEM – LET US ASSIST

First U. S. AUTOMATIC TESTER for mechanical textiles up to 50 lbs.

"SCOTAMATIC"

Unattended Yarn and Cord Testing and Recording

SAVES OVER 50% ON LABOR



- fully automatic operation testing a series of specimens from a single package or from many packages in sequence.
- capacities up to 50 lbs. tensile.
- operates in either standard atmosphere or bone dry, according to Industry practices.
- printed tape records and tabulates ultimate tensile and elongation as well as stretch at predetermined load.

"Scotamatic" is shown here in conjunction with Model IP-4 Incline-plane Tester which is world-standard in the Tire Cord Industry.

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SCOTT TESTERS, INC.

100 Blackstone St., Providence, R. I.

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New Symbol of World Standard Testing

Is this the World's Toughest Test For Brushes?

Jenkins' METLKOR Scrubber Brush

When Dewey and Almy Chemical Company developed their high-speed blanket printing process "DAREX VERSA-PRINT" a difficult problem arose. Colors picked up by the "DAREX" embossed blanket had to be removed with each turn around . . . colors that contained gums, resins, rubbers, etc. They had to be removed by solvents, detergents and high pressure water sprays at washing and drying speeds of 180 yards a minute. A special automatic machine, the "DAREX" washer was developed, in which seven specially designed Jenkins' METLKOR brushes are used.

The DAREX Model ND Blanket Washer Unit

CRUCIAL TEST FOR JENKINS' BRUSHES

"It is difficult to imagine conditions more severe than for the first three scrubbing brushes in this machine," states Mr. H. H. Bailey, Sales Manager of Printing Products Division of Dewey and Almy Chemical Co., Div. of W. R. Grace and Co. "Temperatures range from 40° to 212°F. Vapors range from saturated steam to mixtures including high percentages of mineral and organic solvents, caustics and acids. At speeds up to 1300 rpm the brushes must not vibrate. Jenkins' brushes are more than equal to these requirements and provide long and satisfactory life."

Specify Jenkins' METLKOR . . . the original . . . the best Metal-Core Brush

METLKOR®

CYLINDER BRUSHES

and **LIFEWOOD®** WOOD BACKED BRUSHES

M. W. JENKINS' SONS, INC.

Serving Industry for 80 Years

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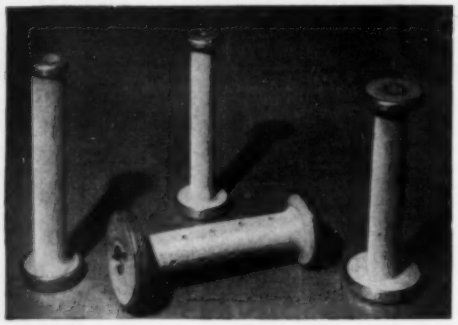
CIRCLE 90 ON READER SERVICE CARD

IT'S PARKS FOR SPOOLS . . . .



Over 100 YEARS' EXPERIENCE on . . .

- **SPOOLS, BOBBINS**
- **Jack, DRESSER, MULE CARD, CONDENSER SPOOLS (with fibre or wooden heads)**

We also manufacture aluminum barrels for JACK SPOOLS

Spools For . . .

COTTON
Warper and Twister Spools

WORSTED
Roving, Twister, Speeder and Drawing Spools

Carpet, Tire Cord, Cordage, and Tape Mills. Also Plastic Yarn Shipping Spools

Warp Beams For . . .

Narrow Fabric

Spools Equipped with Anderson Rim or Boynton Shields Up to 6" Head Diameter if Desired. Also with Dixon Drivers or Brass Bushings.

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EST. 1851
WINCHENDON, MASS.

Representative **HURLEY & HARRISON, INC.**
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Representative **RICHARD C. HURLEY**
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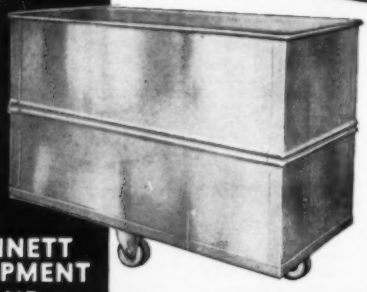
CIRCLE 271 ON READER SERVICE CARD

KEMCO Ends costly snags, tears, rust

ENDS MAINTENANCE COST IN WET MATERIAL HANDLING



These trucks quickly save their cost, permanently increase operating efficiency. Worth investigating. Write immediately for complete details.

- End the painting, repair and other maintenance costs that are a constant drain on profits. Save by investing in *stainless steel* tank trucks. Mills everywhere prove day after day that YOU TOO, can save money, speed production, obtain a higher output of first-quality work. With thirty years specialized experience in designing material handling equipment for the textile industry, we'll show you how and why, with a modest initial investment, you'll save by ending snags, tears, rust, and other spoilage.

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Kennett Square
Pennsylvania, U. S. A.
(Division of F. F. SLOCOMB CORP.)

MATERIALS HANDLING SPECIALTIES

CIRCLE 272 ON READER SERVICE CARD

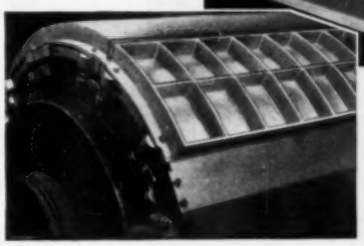
Booth

Originators of **SUPR-O-TAPE • SUPR-O-BAND • STRIP-O-MATIC • MICR-O-GRIND**

MANUFACTURERS OF QUALITY CARD CLOTHING SINCE 1892

GRAN-O-TOP—*SRRL Granular Card Conversion*

Booth Gran-O-Top Granular Card Conversion is a complete conversion unit, including Gran-O-Top Sections, all make-up pieces, special SRRL Lickerin Cover and Pre-Opener Roll. Booth Gran-O-Top Conversion Units are available to fit all current 40" Flat Top Cards.



BOOTH GRAN-O-TOP OFFERS THESE ADVANTAGES:

1. Quality Maintained.
2. Flat Waste Eliminated.
3. No Flat Stripping or Grinding.
4. Simple Carefree Operation.
5. Reduced Weight.
6. Twenty percent less power required to drive card.
7. No moving parts.
8. Operating Costs Down

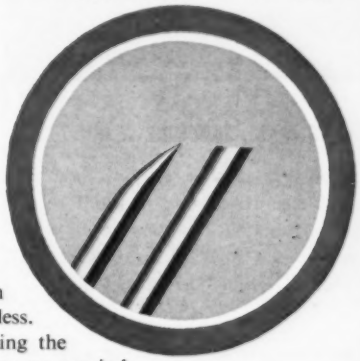
Combine BOOTH MICR-O-GRIND with GRAN-O-TOP for the ultimate in cotton carding.

REDUCE YOUR NEP COUNT with MICR-O-GRIND*

CARD CLOTHING *Pat. Pending

MILL TESTS SHOW:

Nep count reduced up to 60%
Blending improved substantially
Yarn Strength up 10%
Grinding 80% less frequent
Grinding time less than 30 minutes compared to 6-8 hours for surface grinding
Stripping 65% less frequent



Booth card clothing may be obtained with a hardened extra sharp needle point which reduces grinding frequency to once a year or less. With your first purchase of this new clothing the MICR-O-GRIND head is available so that you can regrind it yourself.

A COMPLETE LINE OF QUALITY CARD CLOTHING INCLUDING FAMOUS BOOTH STRIP-O-MATIC AND ALL CONVENTIONAL COTTON, WOOL AND WORSTED TYPE CLOTHING FOR CYLINDER, WORKER, DOFFER, FANCY AND LICKERIN.

SEND FOR DESCRIPTIVE FOLDER. ORDER NOW FOR PROMPT DELIVERY. PHONE: PHILADELPHIA, REGENT 9-8989. CHARLOTTE, EXPRESS 2-3137

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ALLEGHENY & JANNEY STS., PHILA. 34, PA.

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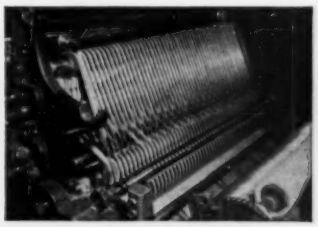
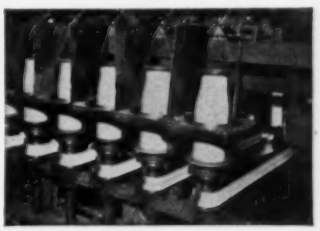
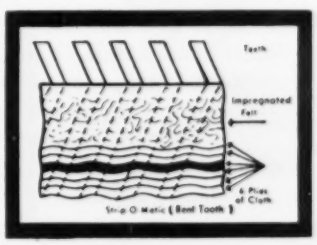


SUPR-O-TAPE . . . the new proven condenser tape for longer life—improved roving—no stretch—no cracking—no need to oil—no dropped ends—holds square edges indefinitely.



SUPR-O-BAND . . . a new banding for spindle drives on twisting, roving and spinning frames for longer life—high friction surface—rough, rugged construction—positive drive—LINT FREE.



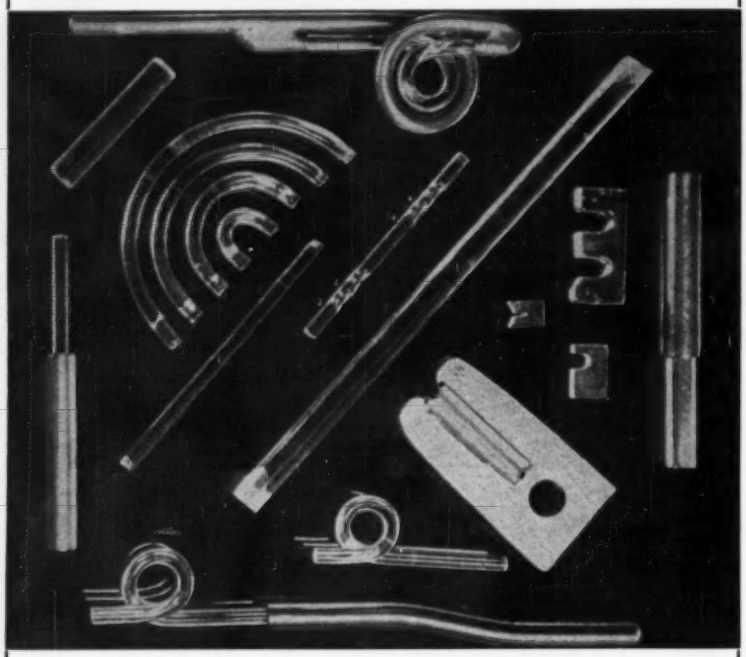
STRIP-O-MATIC. . . clothing greatly reduces stripping waste, down time and costs.

Booth

Specify SAPPHIRE* GUIDE SURFACES

1. FOR YOUR TROUBLE SPOTS

2. ON YOUR NEW MACHINES



TODAY'S SPEEDS AND ABRASIVE YARNS MAKE SAPPHIRE A MUST

Follow the lead of the synthetic yarn manufacturers who "Try SAPPHIRE First" when wear is the problem. Large and constantly growing SAPPHIRE installations have proven the economy of demanding the best. The extreme hardness and flawless surfaces of SAPPHIRE minimize guide wear, second quality products, and costly maintenance shut-downs.

Design with SAPPHIRE in mind and reap the benefits of top quality guide surfaces at competitive first cost. Utilization of simple SAPPHIRE shapes in combination with other materials can produce economical wear resistant guides with minimum breakage. End your guide problems before they start. Specify SAPPHIRE.

Engineering assistance on your SAPPHIRE guide designs is available without obligation.

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INDUSTRIAL SAPPHIRE CO.
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STOP STATIC with a Chapman STATIC ELIMINATOR

The *Original* Electronic Static Eliminator, since 1904

Constantly Improved to give you guaranteed static elimination.

OVER 50 YEARS EXPERIENCE AND 'KNOW-HOW' IS AVAILABLE TO YOU WITHOUT OBLIGATION

Write and tell us about your static problems and we will make recommendations and quote prices.

The Portland Company
28 FORE STREET • PORTLAND, MAINE • U. S. A.

CIRCLE 273 ON READER SERVICE CARD

FOR EASY-TO-FIND INDEX TO PRODUCTS AND SERVICES ADVERTISED SEE PAGE 209

SPINNING RINGS BY KLUTTZ

for

- FULL SPEED BREAK-INS
- HIGHER SPINDLE SPEEDS
- LONGER TRAVELER LIFE
- HIGHER QUALITY YARNS
- FEWER ENDS DOWN

Lubricased "*Black Magic*" Rings

Lubricased spinning and twister rings of premium carbon steel are the results of years of research and development to produce a ring to fill today's needs for higher traveler speeds and increased yarn production. After manufacture, the rings are given a nitriting bath for extreme hardness, then polished and buffed. Kluttz Rings at this stage are equivalent to the best nitrited or carburized rings obtainable.

Kluttz Rings are subjected to the LUBRICASE bath which impregnates the ring and imparts a dry lubricity to the surface of the steel which permits faster traveler speeds and longer life. LUBRICASE RINGS are available in 28 different curved or straight wall sizes.

Microlustre

These Kluttz Rings are of the same high quality carbon steel, the only difference being the Lubricase treatment. Microlustre finished to fine surfaces for quick traveler break-in. Will not break in as fast or permit high traveler speeds such as Lubricase Rings. Available in 28 different straight or curved wall sizes.

Quotations on large rings, common rings and special twister rings will be furnished on request. KLUTTZ RINGS UNCONDITIONALLY GUARANTEED TO GIVE MAXIMUM SERVICE AND COMPLETE SATISFACTION.

KLUTTZ RINGS, INC.

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Representatives:
Thomas H. Watson, Maiden, N. C.
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"Precision" Made Cast Tooth

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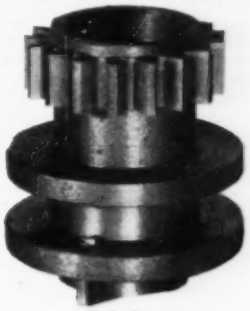
- BOBBIN SHAFT GEARS • SPINDLE SHAFT GEARS • SPLIT AND COUPLING GEARS

Kluttz manufactures a complete line of precision made cast tooth gears of the highest quality for H & B, Saco Lowell, Whitin and Woonsocket frames. We also manufacture cut tooth gears of all descriptions. Quotations furnished at no obligation. No job too large or too small.



Shaft Gears

CAST IRON RING HOLDERS

Kluttz specializes in the manufacture of any size ring holder to your specifications. Made of highest grade cast iron for strength with pin type traveler cleaners installed. Kluttz ring holders have a tapered base and ring seat.

Complete stock of standard size holders available in 48 sizes from 1 15/16" to 5".

Ring Holder

THERE IS NO SUBSTITUTE FOR QUALITY

KLUTTZ MACHINE & FOUNDRY CO.
GASTONIA, N. C.

CIRCLE 93 ON READER SERVICE CARD 93

Woolen and worsted textile machinery

A complete line of accessories, supplies and maintenance parts.

CARD CLOTHING
GARNETT WIRE
NAPPER CLOTHING
CONDENSER TAPES
RUBB APRONS

The skillful integration of Davis & Furber methods, materials and machinery with your mill results in "CO-ORDINATED PRODUCTION." It means increased profits for you. Ask us for information on this. Send for copy of the D&F News to help with your planning.

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Automatic Box Dusters — Cone Dusters
Ceiling Condensers — Heavy Shredders
Automatic Oilers — Rag Pickers
Fearnaught Pickers — Mixing Pickers
Wool and Rayon Openers — Burr Pickers
Pickers for every purpose

★ CARDING MACHINERY for

Woolen, Worsted, Asbestos, Rayon, Felt and Waste
Bramwell Feeders — Sample Cards — Garnett Breasts
Tape Condensers, *Single and Double Apron*, Balling Heads, Grids or Screens, Can Coilers, Machines for Mounting Card Clothing, Doffer Combs, Waste End Conveyors, Card Grinders, Center-Draw Broad Band Intermediate Feeds, Burr Removers.

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Spinning Frames for Wool, Shoddy, Cotton, Rayon and Mixtures, Spinning Frames for Carpet Yarns, Standard Type and Large Package Mules, High Speed Warp Spoolers, Warp Dressing Frames, Beamers, Warp Compressors, High Speed Warping Systems
Reels, *Pin or Pinless* • Dresser Creels • Skein Reels

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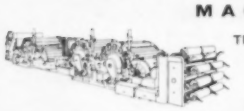
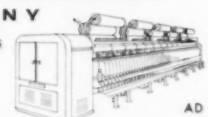
Single and Double Acting Nappers for Wool, Rayon, Worsted or Cotton Goods, Woven or Knitted.
14, 20, 24, 30 and 36 Rolls
Napper Grinders — Chinchilla Machines

DAVIS & FURBER
MACHINE COMPANY



TEXTILE MACHINERY DESIGNERS AND MANUFACTURERS
North Andover, Mass.
Charlotte, North Carolina



AD 12-3

CARDS • SPINNING FRAMES • PREPARATORY MACHINERY • WARP DRESSING MACHINERY • FINISHING MACHINERY
MACHINERY MODERNIZATION • ACCESSORIES, SUPPLIES, CARD & NAPPER CLOTHING, GARNET WIRE, TAPES & APRONS
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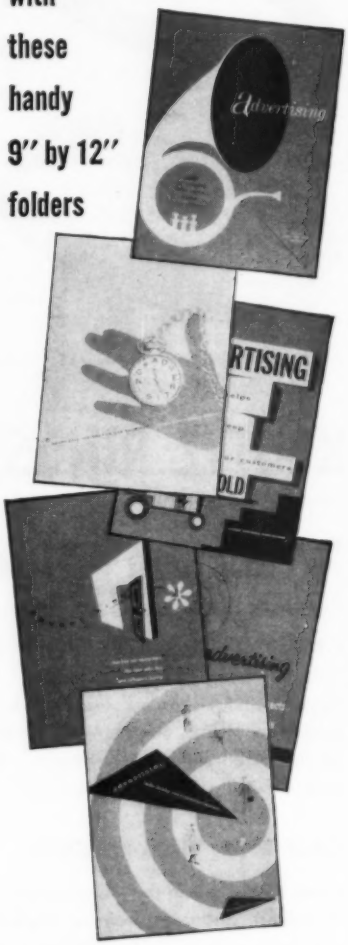

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■ **ADAMSTOP** monitors all roving production from sliver to spindle. If the roving slackens or breaks due to any roving failure, the Adamstop drop wire falls to either side making contact which stops the frame.

■ **ADAMSTOP** enables roving frame operators to supervise up to 25% to 100% additional spindles.

■ **ADAMSTOP** is thoroughly proven for maximum efficiency in mill operation.

■ **ADAMSTOP** representatives are available for consultation and service at all times.

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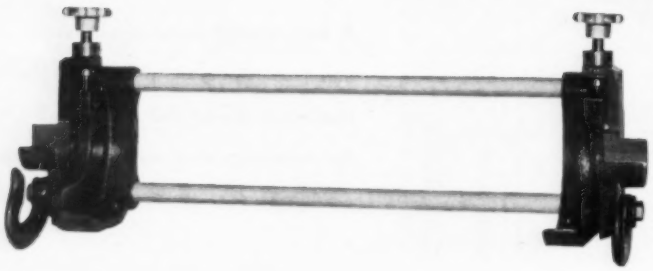
Now . . . you can eliminate "low middle" grinding and springing action on the flats caused by the excessive weight of conventional steel or iron drum grinders. The ALUMAROY is barely half the weight of old fashioned drum grinders **and** it's easier to handle. Flats can be accurately set to the cylinder with the maximum carding surface utilized.



ROY'S MICROCISION GRINDING CRADLE

Here's another Roy first . . . a new micrometer feed-type cradle which takes the guess work out of "ear settings". Your card grinder will have positive, **visual** control of all adjustments when grinding flats. More . . . MICROCISION cradles eliminate taper grinding of flats. (No more offset adjustments of flexible bends to compensate for taper conditions.)

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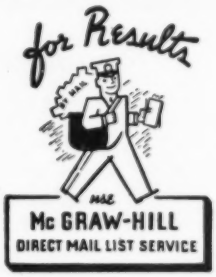

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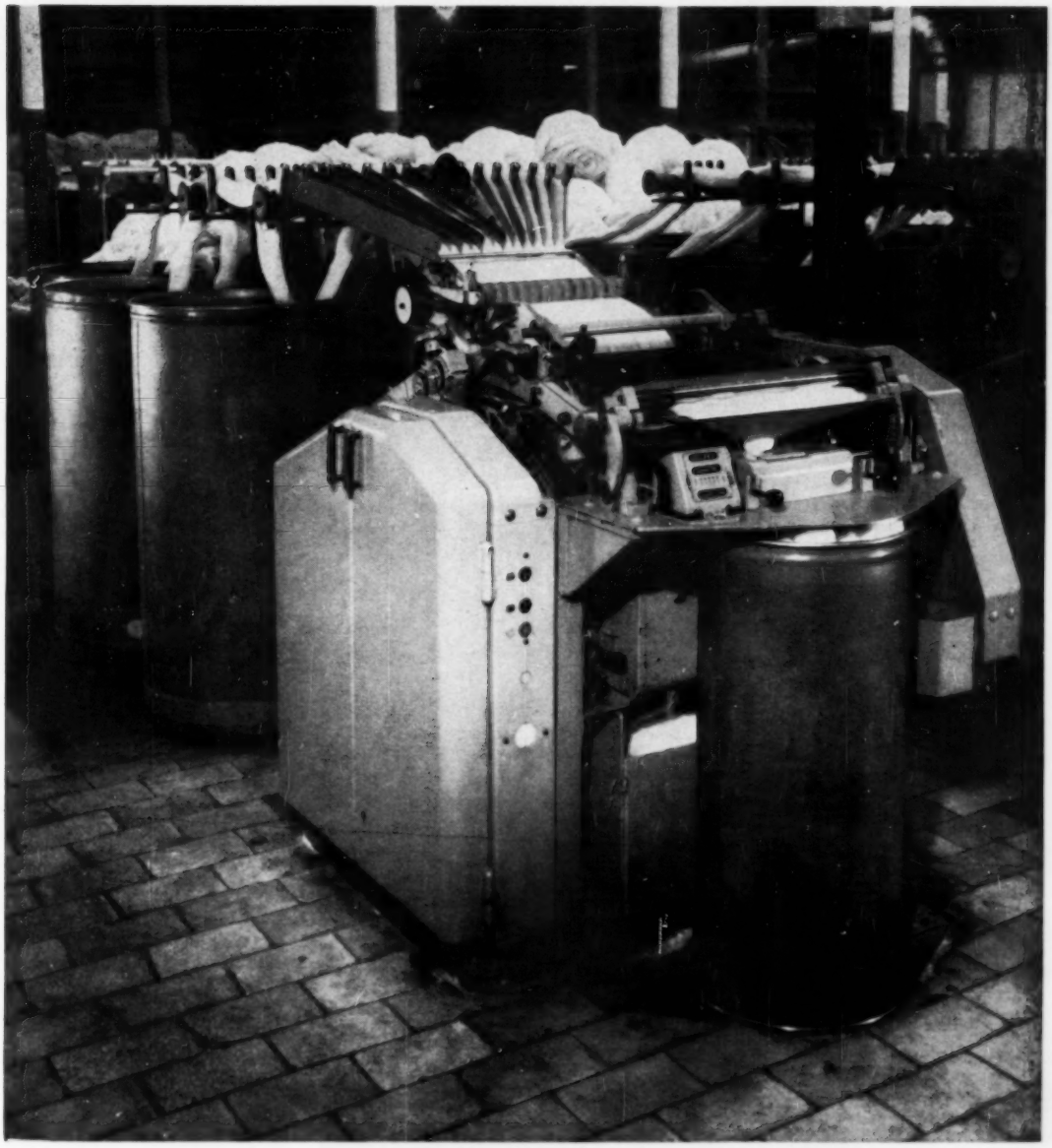
for French-Type Worsted Mills



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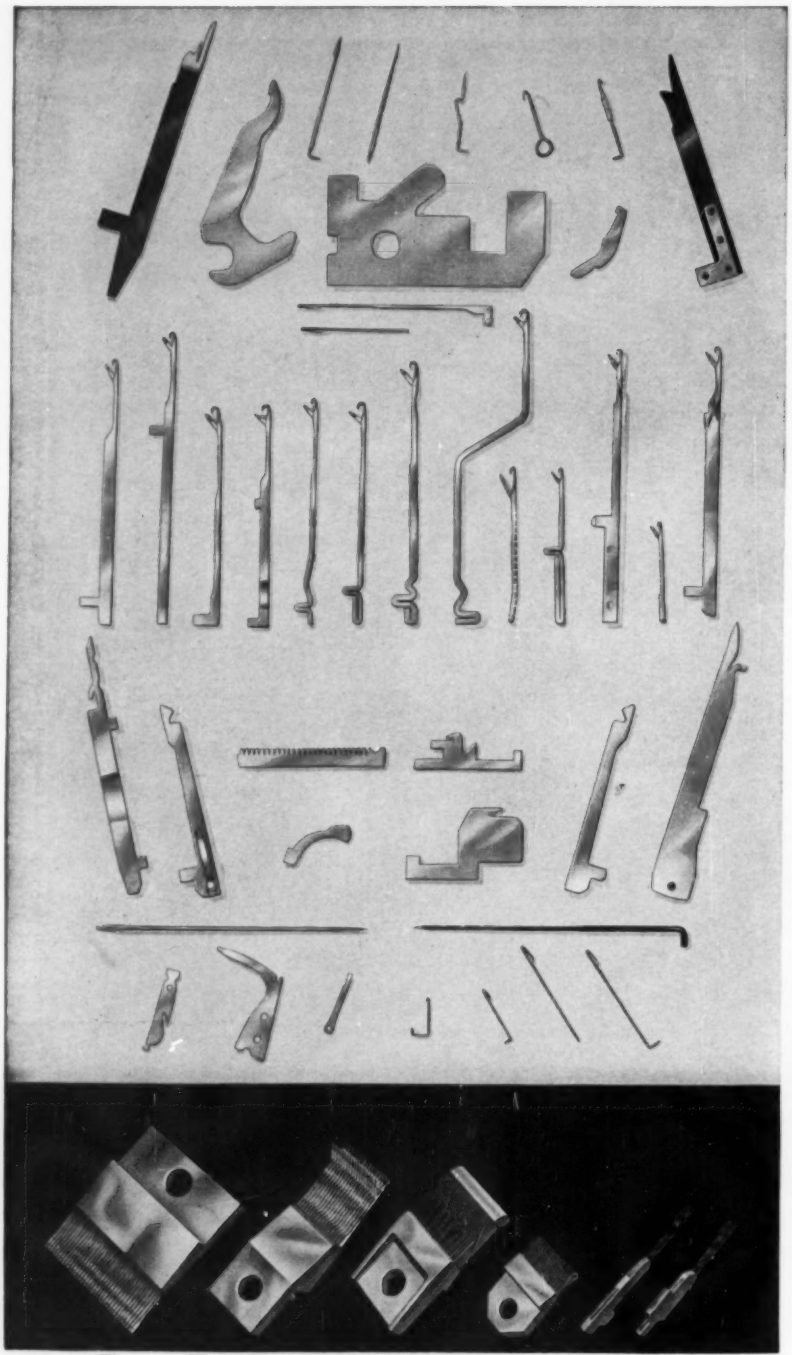
CIRCLE 97 ON READER SERVICE CARD 97



Nearly every competitive advantage starts with the machine

The products illustrated here are a few of many needles and parts available for every type of knitting — Full-Fashioned, Tricot, Raschel and Circular—and every make of knitting machine. Textile Spring-Beard Needles and Parts, and Arrow Latch Needles and Parts are made to "Textile" standards of precision. Prompt deliveries from stocks in Reading, Pa., Asheboro, N. C. and Manchester, N. H. . . . Write us your requirements.

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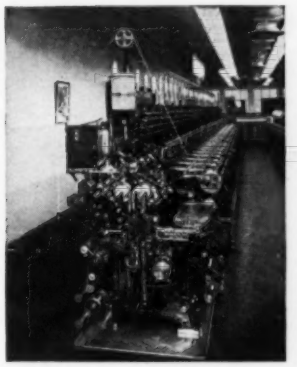
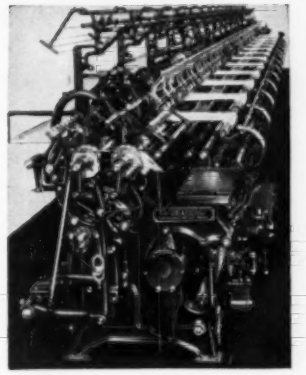
Builders of Textile Machinery Since 1900

Nearly every competitive advantage starts with the machine



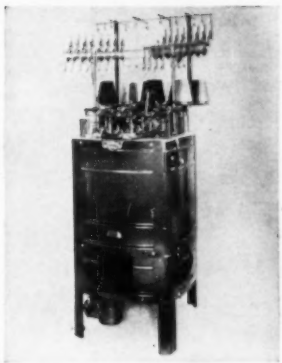
the "READING" Full-Fashioned Knitting Machine

The "Reading", with mill-proved automatic features, almost thinks for itself — automatic narrowing heads, automatic friction boxes, automatic two-carrier friction box for main and welt yarns, automatic welt bar unhooking, automatic thread separator. These machines assure continuous, uninterrupted production, lower per dozen cost, and they place emphasis on greater machine efficiency. 30 and 38 section. 51 to 75 gauge.



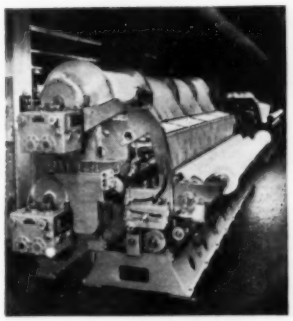
the "READING" Full-Fashioned Outerwear Machine

Within practical limits, there is virtually nothing your designer can create that cannot be successfully produced on the "Reading" Full-Fashioned Outerwear Machine. All-over lace or mesh fabrics, stripes or insertions, intricate patterns, mock ribs; intarsia patterns with closed split between yarns, permitting full length design or insertions with continuous or interrupted pattern; three-colored stripes in any sequence with automatic control. Body machines —10, 12, 13, 15 sections; 28″, 31.5″ needle bars; all practical gauges 9 through 39. Body-Sleeves—20 sections; 20″ needle bars; all practical gauges 9 through 39.



the "READING" CK-A Circular Knitting Machine

The new "Reading" CK-A Circular Knitting Machine cuts pattern-knitting time in half. There are four feeds or knitting stations, each equipped with four fingers. Standard machine includes automatic lubricating system, individual motor drives, electric stop motions. 3¾ inch diameter cylinders, 84, 112, and 168 needle count. Makes inlaid patterns in complete range of men's and boys' sizes.



the "READING" Tricot Machine

The new "Reading" Tricot Machine doubles production of the finest tricot fabrics with controlled quality in every yard. Double production . . . yard after yard of clear, even fabric . . . and the quality never varies. 800 courses per minute and better. Heavy, rigid construction throughout — the base alone is a 2-ton casting. Balanced motion is achieved by an eccentric mechanism which replaces conventional cams. Available in 2 and 3 bar models.

▼

Manufacturers working with "Reading" Machines value "Reading" Service as second only in importance to the machine itself.

Other Textile Products:
The "Reading" Braiding Machine
Textile Spring-Beard Needles
Arrow Latch Needles

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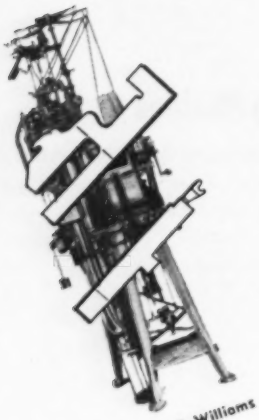
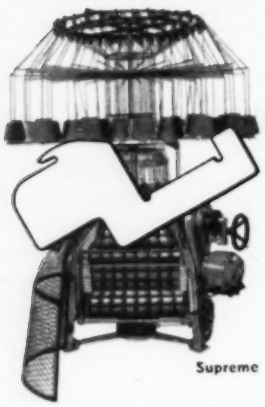
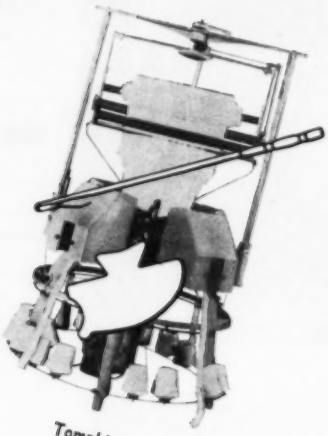
CIRCLE 99 ON READER SERVICE CARD 99



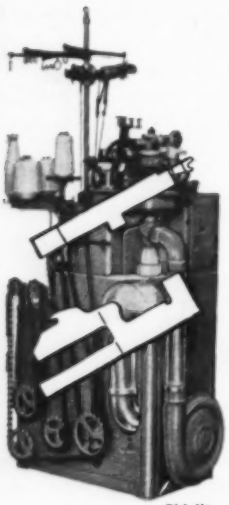
Scott & Williams



Supreme



Tompkins



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Excellence Doesn't "Happen" — It is *PRODUCED*

Here at IVES, we never leave anything to chance. For 89 years, the finest steel, expert craftsmanship and infinite care have gone into the manufacture of every needle and knitting machine part that has left this plant.

That is why IVES' products have always been known for their excellence in design, workmanship, and wearability.

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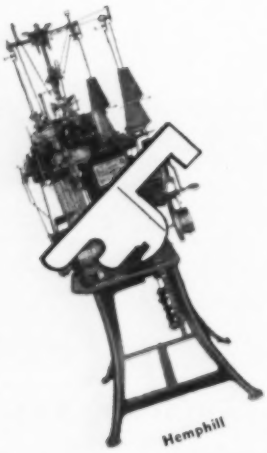
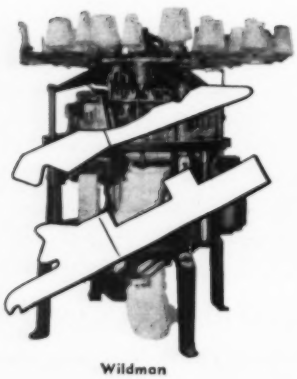


Hemphill



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- High Speed Tricot Machines (2—3—4 bars).
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Your Reiner representative will be glad to call and discuss your needs with you

In the manufacture and sale of these machines, we shall continue to live up to the **REINER tradition of QUALITY machines**, a reliable advisory and parts service, and careful, conscientious attention to your orders and wishes.

Write for our richly illustrated catalogs.

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CIRCLCE 273 ON READER SERVICE CARD

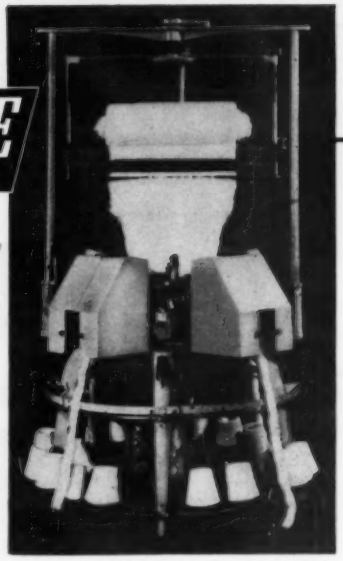
yes, Tompkins versatility includes . . .

HIGH PILE FABRIC

at the Industry's Lowest Cost!

Here's the compact, efficient machine you need for money-making, top-quality production of high pile fabric . . .

It's the new TOMPKINS S-1 JUNIOR with carding units to produce high pile material in a variety of sizes, weights and sliver content!



Available in two models with cylinder interchangeability from 12" to 28" (S-1 Jr.) and 24" to 38" (S-1 Sr.), this knitter gives you the proven quality and economy of a fully modern Tompkins circular spring needle machine. Model shown has four high pile cards and feeds, each with stop motion control, and triple stop motions in the knitting mechanism. Features a patented, gearless drive and vacuum air cleaner. *It will pay you to get full information — write, phone or stop in now . . .*

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OTSA Equipment

For really fast production of top quality JERSEY with 1" x 1" rib border the new ORDNANCE OTSA 32" model with 32 feeds is a production unit that assures you the LOWEST unit-cost, the TOP operating profit. Investigate to-day!

You get the greatest benefits of fully automatic circular knitting machines . . . styling versatility plus fast production of consistently first quality bodies . . . with 8 and 12 feed O.G. equipment.

Unmatched for *economically* producing "bulkies" because, with easy-to-make adjustments and with the minimum of "down-time" you can produce the *widest* variety of over-all or combination stitch formations. You can produce an almost limitless range of fast-selling EXCLUSIVE patternings of plain or fancy stitches, with or without cuffs with natural or synthetic yarns.

You can knit on 8 feeds with O.G. 18" or 24" model or on 12 feeds with the 30" or 32" model. • All O.G. machines are available in any cuts from 3 up and with 3-color stripers on all feeds.

ORDNANCE equipment permits styling creativity that ends over-production of ordinary knitted goods that too often must be sold at a sacrifice.

Check the many *exclusive* ORDNANCE features—replaceable forecut walls on both cylinder and dials . . . 2-speed drive . . . dogless head . . . simplicity and accessibility of removable and replaceable parts, made possible by Ordnance exclusive unit-construction of all sub-assemblies.

QUICK CONVERSIONS OF YOUR PRESENT EQUIPMENT Your fine cut machines can be converted to coarse gauge at our factory. This work can be completed including a thorough overhaul, in a matter of weeks. Write for open availabilities, estimates, recommendations, to our Engineering Department.

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HAE-OG 8/17/359

CIRCLE 295 ON READER SERVICE CARD

Model SAAF-C

Plain, Variable Striped and Patterned Jersey

Model SAAF-O

Sleeve and Body Jersey with Elastic Rib Trim & draw-thread separations

Model MLT-SA

Plain and Striped, Regular and Long Loop Terry

Model SAI-PP

1 x 1 Striped and Patterned Rib with draw thread separation — Also Swiss Rib and Interlock Fabrics

Model LRP

"Vent-Knit" Patterned mesh

Model ROF

Jacquard-Type Floatless Patterns

Model MJ

Body Size Jersey

Model IC

Fleece Coatings

Models ML; MLV

Pile, Loop and Plush

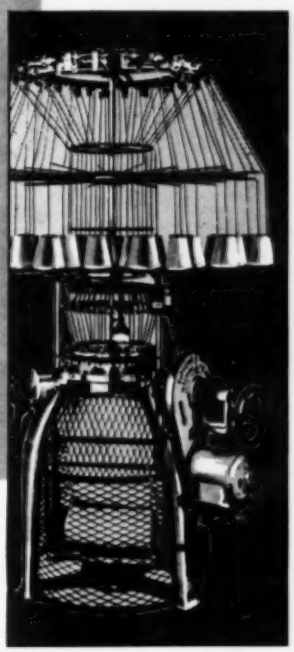
Model BRW

1 x 1 and Half Cardigan Plain and Patterned Bulky Fabric

Model HP

High Pile, Imitation Fur, Lining Fabrics and Carpetings

SPECIALIZED INDUSTRIAL FABRICS



THE BEST-SELLING FABRICS OF TODAY AND TOMORROW ARE *PROFIT-KNIT* BY SUPREME MACHINES

New and faster ways to knit the fabrics the world wants . that's the formula responsible for Supreme's dynamic line of successful circular knitting equipment.

By giving the outerwear and underwear industry higher production, market-meeting versatility plus new types of fabric, Supreme has opened new routes to profit. Today, Supreme research is smashing more profit barriers. It is finding new ways to give knitters more production per square foot of space, more poundage per operator, more profit per day.

When you modernize, be sure to get the facts on Supreme's newest profit-knitting developments.

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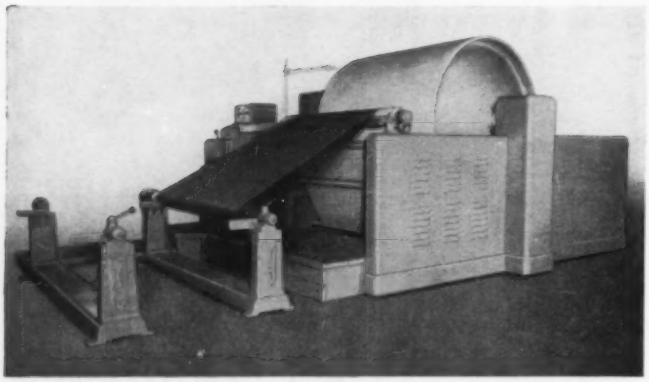
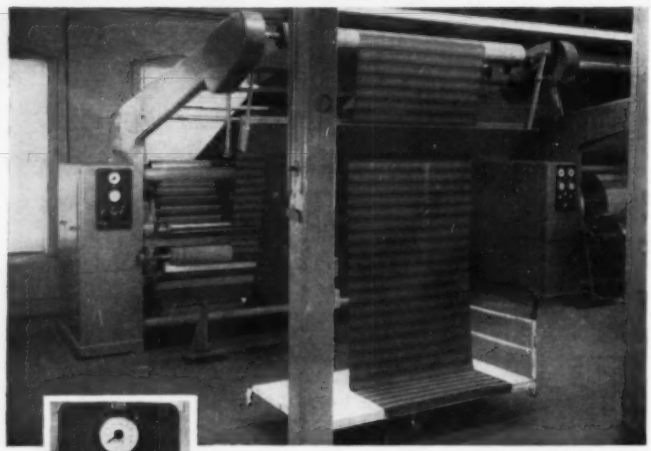
Gessner sets high production and quality records for decating and napping



The hydraulically powered GESSNER VERSAMATIC SEMI-DECATING MACHINE, with a 36", 48" or 60" diameter cylinder, infinite speed variations, controlled pressure rolls, automatic apron alignment and apron tension reaches high operating speeds. The 60" Versamatic shown here, for example, decates 8 pieces or more of woolens or worsted, and upwards of 1000 yards of synthetics per loading.

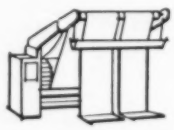


24 Roll Single Acting Hi-Torc Napper for fleeces, zebilines, suedes, vicunas, cashmere and camel's hair coatings.

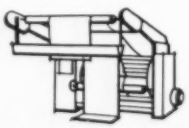
GESSNER HI-TORC NAPPERS

are now doing five times the work of the nappers they replaced in a synthetic blanket mill, a woolen mill and a cotton blanket mill — and three times, the work on unbleached cottons, bleached cottons and synthetics.

Gessner also manufactures Presses, Vacuum Extractors, Gigs, Spot Proofing Machines, Scutchers, Hydrolizers, Shrinking Plants, Brushes, Boiling and Crabbing Machines.

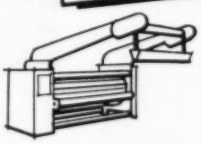


30 Roll Double Acting Hi-Torc

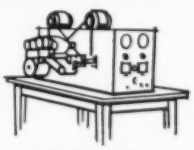


24 Roll Double Acting Hi-Torc

24 Roll Single Acting Hi-Torc



24 Roll Knit Goods Hi-Torc



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Dyeing 111

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SINCE 1883

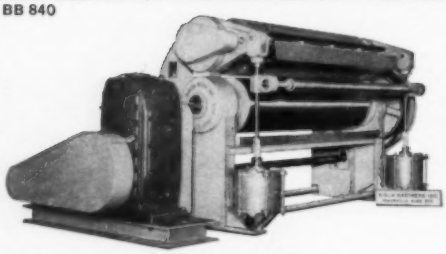
BIRCH

DYEING and FINISHING MACHINERY
CLOTH HANDLING EQUIPMENT
MILL SEWING MACHINES

BB 935

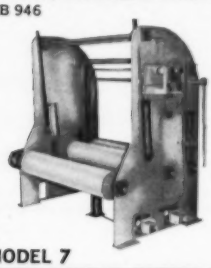
MODEL MF
Automatic Butt Seam
Grey Room Sewing Machine

BB 840



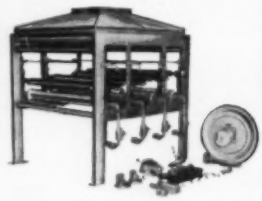
Squeeze Roll Extractor

BB 946



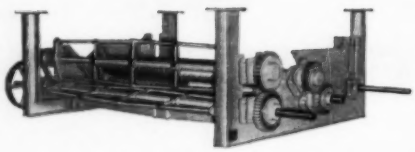
MODEL 7
3 Roll Automatic
Cut-Off Winder or Batcher

BB 948



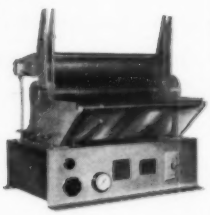
Horizontal Open Flame
4 Ribbon Burner Singe Section

BB 880



Heavy Duty
Single Roll Scutcher

BB 932



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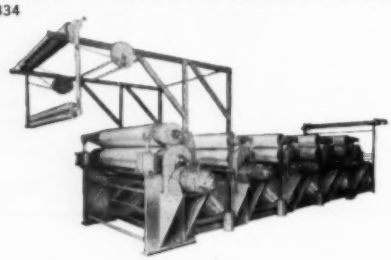

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BLEACHING

Preparation of Soda Bleach Liquors

Table 1 indicates the pounds of chlorine and 76% caustic soda, respectively, required per 1,000 gals. of bleach, for concentrations ranging between 10 and 172.5 gms. of available chlorine per liter. The table also shows the corresponding amount of excess caustic soda that will be obtained, which is also the minimum amount that should be used commercially where a product of good stability is required. The corresponding "Trade Percent," the approximate percent by weight, and the approximate specific gravity of freshly prepared solutions are also shown in the table.

Soda Bleach Liquor From Chlorine and Caustic Soda

Available chlorine			Pounds per 1,000 gals. bleach liquor		Excess caustic soda (NaOH)		Approximate specific gravity of finished bleach liquor (at 20° C.)
Nominal % (trade designation)	Grams per liter	Approximate % (by weight)	Chlorine	Commercial caustic soda (98% NaOH)	Grams per liter	Approximate % (by weight)	
1.0	10.0	...	83.4	118.9	2.7	0.27	1.02
....	10.2	1.0	85.1	121.7	2.8	0.28	1.02
2.0	20.0	....	166.8	220.8	3.4	0.33	1.03
....	20.7	2.0	172.6	227.4	3.4	0.33	1.03
3.0	30.0	....	250.2	321.8	4.0	0.38	1.05
....	31.4	3.0	261.9	336.1	4.1	0.39	1.05
4.0	40.0	....	333.6	423.6	4.7	0.44	1.06
....	42.6	4.0	355.3	449.5	4.8	0.45	1.07
5.0	50.0	....	417.0	524.7	5.3	0.49	1.08
....	54.0	5.0	450.4	565.6	5.6	0.52	1.08
6.0	60.0	....	500.4	626.5	6.0	0.55	1.09
....	65.8	6.0	548.8	684.7	6.3	0.58	1.10
7.0	70.0	....	583.8	727.5	6.6	0.60	1.10
....	78.0	7.0	650.5	808.5	7.1	0.64	1.11
8.0	80.0	....	667.2	828.6	7.2	0.64	1.12
9.0	90.0	....	750.6	930.4	7.9	0.70	1.13
....	90.3	8.0	753.1	933.3	7.9	0.70	1.13
10.0	100.0	....	834.0	1031.4	8.5	0.74	1.14
....	103.2	9.0	860.7	1063.9	8.7	0.76	1.15
11.0	110.0	....	917.4	1133.3	9.2	0.80	1.16
....	116.2	10.0	969.1	1196.2	9.6	0.83	1.16
12.0	120.0	....	1000.8	1234.3	9.8	0.84	1.17
....	129.8	11.0	1082.5	1333.4	10.4	0.88	1.18
13.0	130.0	....	1084.2	1336.2	10.5	0.89	1.18
14.0	140.0	....	1167.6	1437.2	11.1	0.93	1.19
....	143.5	12.0	1196.8	1473.3	11.4	0.95	1.20
15.0	150.0	....	1251.0	1539.1	11.8	0.98	1.21
....	157.9	13.0	1316.9	1619.1	12.3	1.01	1.21
16.0	160.0	....	1334.4	1640.1	12.4	1.02	1.22
17.0	170.0	....	1417.8	1742.0	13.1	1.07	1.23
....	172.5	14.0	1438.7	1766.8	13.2	1.07	1.23

Courtesy Solvay Sales Corp.

NOTE:—For less than about 50 gms. per liter available chlorine, it is better to prepare about 50 gms. per liter bleach and then dilute finished bleach to strength desired.

Table 2 shows the pounds of chlorine, caustic soda, and soda ash required to produce 1,000 gals. of bleach liquor at various concentrations up to 85 gms. of available chlorine per liter. In this table it is assumed that just enough caustic soda is used to complete the reaction with the chlorine, leaving no excess of caustic soda, but adding soda ash in excess sufficient to insure reasonable stability. The excess soda ash expressed in grams of actual sodium carbonate (Na_2CO_3) per liter is shown in the table.

Soda Bleach Liquor from Chlorine and Caustic Soda Plus Soda Ash

Available chlorine grams per liter	Pounds per 1,000 gals. bleach			Excess Na_2CO_3 grams per liter
	Chlorine	Commercial 76% caustic soda	Commercial 58% soda ash	
10	83.4	95.9	42.1	5
15	125.1	144.0	63.2	7.5
20	166.8	192.0	84.2	10
25	208.5	240.0	101.1	12
30	250.2	288.0	117.9	14
35	291.9	336.0	134.7	16
40	333.6	384.0	143.1	17
45	375.3	432.0	151.6	18
50	417.0	480.0	160.0	19
55	458.7	528.0	168.4	20
60	500.4	576.0	176.8	21
65	542.1	624.0	185.2	22
70	583.8	672.0	193.7	23
75	625.5	720.0	202.1	24
80	667.2	767.9	210.5	25
85	708.9	815.9	218.9	26

Courtesy Solvay Sales Corp.

In Table 3 are given the pounds of chlorine and soda ash required per 1,000 gals. of bleach, up to 40 gms. of available chlorine per liter. These are the quantities commonly used in preparing this type of bleach and will yield a bleach that is very active. In some special cases a still more active bleach is desired, in which event the amount of soda ash may be decreased. However, it is not advisable to prepare a bleach that is much more active unless technical supervision is available.

Soda Bleach Liquor from Chlorine and Soda Ash

Available chlorine grams per liter	Pounds per 1,000 gals. bleach	
	Chlorine	Commercial 58% soda ash
10	83.4	278
15	125.1	417
20	166.8	556
25	208.5	695
30	250.2	834
35	291.9	973
40	333.6	1,112

Courtesy Solvay Sales Corp.

Tips on Chlorination of Wool

By RUEDI E. WEBER, JR., in TEXTILE WORLD

The chlorination of wool produces a fiber that won't felt under normal conditions of washing and wear. But to make the process successful, you have to take care not to damage the fiber and must be careful to leave it in a condition to dye easily.

Chlorine reacts very quickly with wool; and conditions of time, temperature, pH, and concentration of chlorine have to be carefully established and controlled or uneven dying will result.

Correct pH Important

The accompanying table shows the difference in rate of exhaustion of active chlorine at two extremes, pH 4 and pH 10. At the higher pH, exhaustion of chlorine is very slow. At pH 4 the loss is approximately 77.5% in 1 min.

In an acid bath, active chlorine will practically disappear within 5 to 10 mins. of use; but if the bath is alkaline, traces of chlorine can be found after 60 mins.

Because acid chlorination produces superior antifelting qualities, low pH formulations that give a reduced rate of exhaustion have been developed that combine shrinkage control with level-dyeing properties. Work with a number of acids has shown that lowering the pH of the treating bath with formic acid gives the best all-round results. The temperature of the treating bath should be as low as practical because the rate of reaction between wool and chlorine rises rapidly as temperature goes up.

Acid chlorination would not be practical without suitable buffers. One of the best buffers is paratoluolchlorsulfamide, marketed as Hypak. Polypeptides, substituted for Hypak during World War II, also give excellent results. The accompanying chart shows the effect of polypeptides on the rate of absorption of chlorine from buffered and unbuffered solutions.

Here's a Typical Formula

The following formula has given good results in chlorinating wool:

Bath ratio 1 to 20
8 c.c. of formic acid per gallon
12 c.c. of sodium hypochlorite
30° Bé per gallon
2 grams of polypeptides per gallon

Wool is immersed in the cold bath for 20 mins. and then antichlored with sodium bisulfite and rinsed.

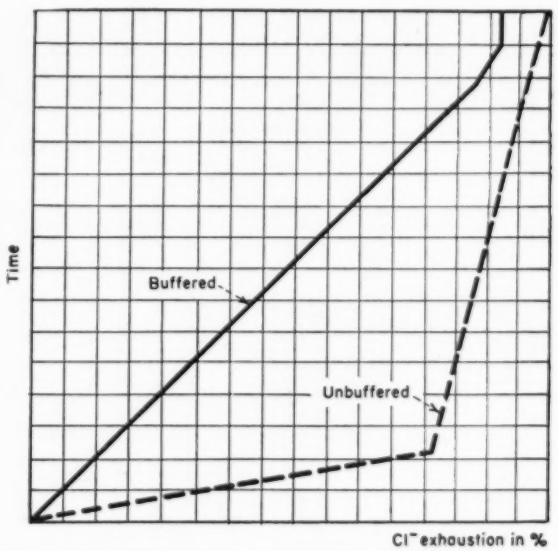
Wool that has been chlorinated can be detected by dyeing in the following formula for 1 hr. at 140 to 200° F.:

2% Erio Chrome Cyanine R
1% Glauber's salt
4% Erio Chrome Mordant
2% ammonium sulfate

Wool that has not been chlorinated will not dye with Erio Chrome Cyanine R by the mordant method.

	Time in mins.	Cl-1 grams per l.	Decrease grams per l.	%
pH 4	0	.0994	—	—
	1	.0284	.0710	71
	3	.0142	.0142	86
	5	.0071	.0071	93
	10	.0071	—	93
pH 10	0	.0994	—	—
	1	.0852	.0142	14
	3	.0710	.0142	29
	5	.0568	.0142	43
	10	.0426	.0142	57
	45	.0284	.0142	71

ABSORPTION RATES of chlorine by wool vary considerably with pH. Buffered acid solutions are preferred for wool chlorination where maximum shrinkage control is needed.



BUFFERS such as Hypak or polypeptides have a marked effect on the rate of absorption of chlorine by wool, as shown here. The difference between unbuffered solutions and solutions containing 0.5% polypeptides owg. is shown in this chart.

Combine Chlorine and Peroxide for Better Cotton Bleaching

By combining the effects of chlorine and peroxide, the Solvay activated hydrogen-peroxide bleaching process is able to produce thoroughly bottomed and bleached cottons at low chemical costs.

The usual prebleaching steps of singeing, desizing, caustic preboil, washing, and/or souring may be followed in the conventional two-stage peroxide process; or the more-recent single-stage process can be used to provide adequate preparation.

Whichever type of preparation is used, the next step is to saturate the goods for 1 min. in a sodium-hypochlorite solution squeezed out so that the goods carry 0.1% NaClO. The fabric is piled into a J-box large enough to allow 10 to 20 mins. retention time and are pulled without washing into the regular peroxide saturator.

Peroxide Concentration Reduced

Depending on the goods and the degree of purity before bleaching, the peroxide concentration can be cut 25 to 75% over that necessary in the usual peroxide-bleaching formula.

The pretreatment with weak hypochlorite can also be given in batch processes. When goods are scoured in one kier and washed over into another for peroxide bleaching, they are saturated in hypochlorite and held over as noted just before loading into the peroxide kier.

If the entire process is done in one kier, the hypochlorite may be introduced after the goods have been scoured and rinsed in the kier. The hypochlorite solution is added and circulated for 10 to 20 mins. and then run out, and a peroxide-bleach formula

at suitable reduction is added.

The combined oxidizing agents not only produce improved whites but the ash content is lower, the fluidities are essentially as low as those obtained with straight peroxide, and the whiteness retention is somewhat better. The absorbency of the goods is also somewhat better when the combination process is used.

What Happens Chemically

When the goods containing the hypochlorite are run into the peroxide solution, the reaction is:

$NaClO + H_2O_2 = NaCl + H_2O + 2(O)$

It is preferable to prepare the sodium hypochlorite by chlorinating caustic soda, leaving a small excess of caustic for stabilization. The small amount of free caustic left in the goods after bleaching helps to reduce the retention of silica residues from the peroxide formulation.

If the hypochlorite has been made by chlorinating a soda-ash solution, the residues in the fabric prior to peroxide bleaching are Na_2CO_3 and $NaHCO_3$. The $NaHCO_3$ is converted to Na_2CO_3 by the caustic in the peroxide formula, and soda ash promotes the deposition of silica complexes on the goods and the equipment. Also, it is more difficult to wash out than the caustic residues.

The combined bleaches do not present any critical steps; if the holding time for the hypochlorite-saturated goods is increased from 20 mins. to 180 mins., fluidities are still low, about 6 to 7. On the other hand, the peroxide-bleach retention time can be reduced to 15 mins. and still produce excellent whiteness.

The residual-metal content of samples bleached by the combination process is much reduced, particularly in the case of silica. Typical analyses show that under similar conditions, the activated hydrogen-peroxide bleach process leaves 60 ppm. of silica as compared to 340 ppm. by conventional peroxide bleaching.

Final washing can be done with moderately hard water without reducing the absorbency of the fabric when the combination bleach is used.

The process is available license-free to interested bleacheries.

Courtesy Solvay Process Div., Allied Chemical Corp.

Testing Peroxide-Bleaching Solutions

To Find Peroxide Concentration:

Add a 10-ml. sample of the bleaching solution to about 25 ml. of pure sulfuric acid diluted to about 25% strength.

Titrate the sample with 0.588 N potassium permanganate to a permanent pink color.

Each ml. of 0.588 N potassium permanganate required to reach the pink end point represents 0.1% hydrogen peroxide in the sample.

Here are other indications that can be figured from the titration:

ml. 0.588 N $KMNO_4 \times 0.1$ = percent 100% H_2O_2
ml. 0.588 N $KMNO_4 \times 0.2$ = percent 50% H_2O_2
ml. 0.588 N $KMNO_4 \times 0.286$ = percent 35% H_2O_2
ml. 0.588 N $KMNO_4 \times 0.834$ = lbs. 100% H_2O_2 per 100 gals.
ml. 0.588 N $KMNO_4 \times 1.668$ = lbs. 50% H_2O_2 per 100 gals.
ml. 0.588 N $KMNO_4 \times 2.385$ = lbs. 35% H_2O_2 per 100 gals.
ml. 0.588 N $KMNO_4 \times 0.364$ = approximate volume strength
3 ml. 0.588 N $KMNO_4$ = approximately 1 volume

To Find Alkali Concentration:

To a 5-ml. sample of the bleaching solution, add 5 drops methyl orange indicator.

Titrate with 0.10 N sulfuric acid to a clear yellow color.

Each ml. of 0.10 N sulfuric acid required to obtain the yellow end point indicates 0.667 lbs. of caustic soda or its equivalent per 100 gals. of bleaching solution.

Also:

ml. of 0.10 N $H_2SO_4 \times 0.884$ = lbs. Na_2CO_3 per 100 gals.
ml. of 0.10 N $H_2SO_4 \times 4.92$ = lbs. sodium silicate 42° Bé 1:2.5 per 100 gals. solution
ml. of 0.10 N $H_2SO_4 \times 5.800$ = lbs. sodium silicate 42° Bé 1:3.2 per 100 gals. solution

From a chart prepared by Becco Chemical Div., Food Machinery & Chemical Corp.

Continuous Bleaching With Silicate-Free Peroxide

By B. K. EASTMAN and P. FELDMAN, in TEXTILE WORLD

Sodium silicate has long been recognized as the outstanding stabilizer for alkaline hydrogen-peroxide solutions used in bleaching cottons; but with the advent of continuous bleaching, several drawbacks to sodium silicate developed.

These drawbacks included a tendency to form scale that is deposited on the surface of equipment and the difficulty in washing silicate from the cloth. These difficulties created serious problems in many mills, particularly mills handling sheer fabrics or bleaching cloth prior to dyeing. Defects such as abrasion marks and broken yarns and interrupted production resulted.

Phosphates can replace silicates for formulating stabilized peroxide solutions that do not cause such difficulties. Calcium phosphate is the preferred ingredient for the stabilization. Insoluble in water, the calcium phosphate is formed within the saturator and on the cloth by introducing to the saturator a solution of disodium phosphate buffered with borax. The concentration of disodium phosphate in the saturator can vary over a fairly wide range.

Cotton and water will usually supply sufficient calcium. To be on the safe side, particularly if the cloth has been scoured or if water of zero hardness is used, a small quantity of calcium-chloride solution is continuously added to the saturator.

The pH of the saturator solution is critical and will vary from plant to plant depending on the type of material, treatment prior to bleaching, alkali carry-over, temperature in J-boxes, and end use.

Batch- and continuous-dye results have been highly satisfactory on thousands of yards of cotton cloth bleached by the nonsilicate process.

The new system offers the following advantages: recovery of production previously lost while scale was cleaned from equipment, reduction of seconds and rejects resulting from scale, and elimination of dye troubles caused by silicate compounds left in cloth.

Modern Bleaching Methods: a Comparison

Considerable research has been undertaken to determine the effect on cotton fabrics of the three bleaching methods now in common use.

TABLE 1
SUMMARY OF ANALYSES OF PRINT CLOTH SAMPLES FOR RESIDUAL MATERIALS AFTER THE VARIOUS STEPS OF THREE METHODS OF BLEACHING (KETTERING AND KRAEMER)

Treatment	Alcohol-soluble materials (%)	Wax (a) (%)	Ash (a) (%)	Cellulose (%)	Other materials by difference (a) (%)
Hypochlorite bleach:					
Control	1.98	1.02	1.27	91.22	5.53
Desized	1.16	1.08	0.25	93.12	5.47
Kier-boiled	0.48	0.45	0.22	98.25	1.05
Bleached	0.39	0.39	0.03	98.93	0.65
Peroxide kier bleach					
Control	1.98	1.00	1.24	92.08	4.70
Desized	1.57	1.05	0.63	93.21	4.59
Bleached	0.59	0.56	0.19	98.34	0.68
Continuous peroxide bleach					
Control	1.97	1.03	1.21	91.36	5.46
Desized	1.17	1.02	0.40	92.15	6.28
First Steep	0.88	0.76	0.25	98.40	0.47
Bleached	0.55	0.51	0.13	98.66	0.68
Average					
Control	1.98	1.02	1.24	91.62	5.33
Desized	1.32	1.06	0.43	92.91	5.38
Bleached	0.51	0.46	0.13	98.66	0.67

(a) The values are based on the oven-dry weights of the fabrics. Max is part of the alcohol-soluble materials.

Table I summarizes analyses made on print cloths at various stages of all three bleaching methods. Samples were taken from actual processing in 11 mills—four from the hypochlorite process, three from the peroxide process, and four from the continuous peroxide process.

Table 2 shows the result of three years of ageing on the whiteness of cotton fabrics bleached by the three methods outlined in Table I.

Samples that were exposed to daylight from north windows were enclosed in cellophane envelopes to prevent soiling. Samples stored in the dark were wrapped in black cloth and brown paper. Both sets of samples remained in the same room under varying conditions of temperature and humidity for three years.

A slight gain in whiteness occurred in the samples exposed to light, but the variation among the three bleaching methods was not significant. The conclusion is that all methods produce satisfactory permanent whites with little or no damage to the fiber.

The work is more fully reported in Technical Bulletin 941 of the U. S. Dept. of Agriculture (1947) and TEXTILE WORLD, March, 1952, p. 159.

TABLE 2
CHANGES OF WHITENESS OF BLEACHED CLOTH DURING THREE-YEAR PERIOD (KRAEMER AND GOLDTHWAIT)

Nature of bleach	Original	Exposed to light	Stored in dark
Unbleached	26	51	23
Kier boil and chlorine	82	82	74
Kier boil and peroxide	82	88	74
Continuous peroxide	83	88	78

Hydrogen-Peroxide Bleaching

By H. G. SMOLENS, in TEXTILE WORLD

Hydrogen peroxide is supplied in several concentrations of available oxygen, designated as volumes: 100 volume (27.5%), 130 volume (35%), or 197 volume (50%). This designation means that 1 gal. of 130-volume H_2O_2 will produce 130 gals. of oxygen gas.

If a formula calls for 1-volume H_2O_2 in a 200-gal. bath, use this calculation:

$$\frac{200 \times 1 \text{ vol.}}{130 \text{ vol.}} = 1.54 \text{ gals } H_2O_2 \text{ 130 vol.}$$

With 100-vol. H_2O_2, the calculation would be:

$$\frac{200 \times 1 \text{ vol.}}{100 \text{ vol.}} = 2.0 \text{ gals. } H_2O_2 \text{ 100 vol.}$$

Control of the bleaching bath is extremely important to retain a slow rate of evolution of oxygen since it is nascent oxygen that does the work and not molecular oxygen. Nascent oxygen is obtained by careful control of the pH of the bath and the use of proper alkalis, such as sodium silicate or tetrasodium pyrophosphate.

Equipment must be free of iron, copper, or brass trim. Water, steam, assistants, and the goods themselves must be clean and devoid of metal contaminants that can cause local catalytic effects with resultant damage.

Wool Bleaching

Well-scoured wool is treated in a standing bath for the sake of economy.

A typical yarn formula could be:

H_2O_2 concentration	2 volumes
Total alkalinity	0.025 N
pH	9.6
Temperature	120° F.
Time	2 hrs.

Alkalinity may be supplied by silicate or tetrasodium pyrophosphate, with or without the addition of ammonia.

Wool stock can be bleached in the scouring train by addition of H_2O_2 in the final bowl, but in this case a continuous feed of H_2O_2 and acid is used. The acid is necessary to counteract the alkinity of the scouring bath, and the feed of acid varies with the carry-over.

Cotton Bleaching

Batch bleaching is still done on yarns and knit goods, but most piece goods are now being continuously bleached at speeds up to 350 yds. per min. Special ranges have been developed for this work to accommodate many types of fabric. Open-width and rope-form processing is used in whole or in part, depending on the goods involved.

J-boxes are used to hold a considerable yardage of goods in the initial scouring operation and then after impregnation with peroxide. Various methods of heating the goods in the J-boxes are used. Very thorough washing prior to scouring, after scour-

ing, and after bleaching helps produce clean, well-bleached cloth.

A typical continuous-bleaching formula for a saturating unit is:

H_2O_2 concentration	1 volume
Total alkalinity	0.08 N
pH	11
Temperature not over	90° F.

The alkali may be sodium silicate or silicate plus caustic.

Knit-goods bleaching in open kiers requires:

H_2O_2 concentration	¾ volume
Total alkalinity	0.07 N
pH	10.4
Temperature	185° F.
Time	4 to 8 hrs.

The alkali is generally silicate boosted with soda ash or caustic. Each operation will require some modification, depending on the goods.

Synthetics

Generally, most synthetics can be bleached with peroxide; but chlorine is preferred when low alkalinity and low temperatures must be used.

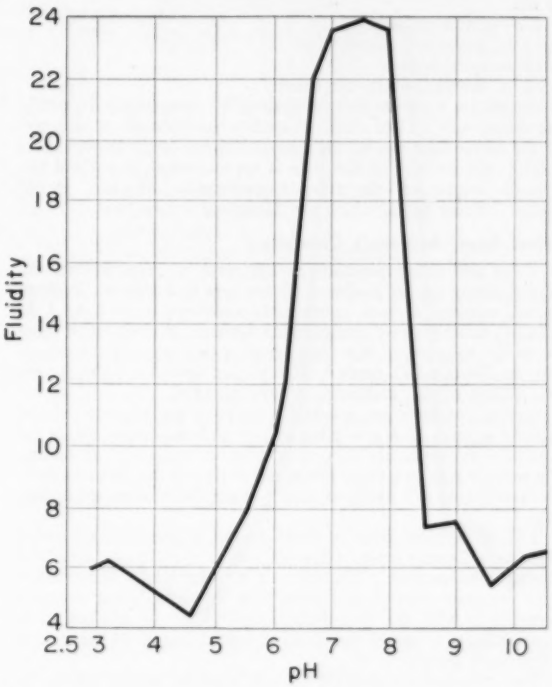
Range bleaching has increased the use of peroxide greatly, but improvements in equipment and auxiliaries will no doubt increase its value and efficiency.

Hydrogen Peroxide (100 Vol.) Conversion Chart

Vol. conc.	Lbs. per 100 gals.	cc. per liter	% H_2O_2	% available oxygen (O_2)	Qts. per 100 gals.
0.25	2.3	2.3	0.076	0.035	1
0.50	4.6	5.0	0.152	0.070	2
0.75	6.9	7.5	0.228	0.105	3
1.00	9.2	10.0	0.304	0.140	4
1.50	13.8	15.0	0.456	0.210	6
2.00	18.4	20.0	0.608	0.280	8
2.50	23.0	25.0	0.760	0.350	10
3.00	27.6	30.0	0.912	0.420	12
3.50	32.2	35.0	1.063	0.490	14
4.00	36.8	40.0	1.215	0.560	16

To substitute 130-vol. H_2O_2 for 100-vol., use 79% by weight or 77% by volume for equivalent results.

How pH of Bleach Bath Affects Cotton Strength



Here is a graphic representation of what happens to cotton exposed to a three-gram-per-liter available chlorine bath for 5 hrs. at varying pH. Note that satisfactory fluidities result from either quite acid or alkaline conditions but that at or near the neutral point fluidities rise rapidly. If a very active bleach is necessary, be sure to get the pH down to 4 to 5.

Reference: Journal of the Society of Dyers and Colourists, Vol. 56, No. 1 P 12.

DYEING

Tips on Package Dyeing

By A. P. ROY, in TEXTILE WORLD

Package dyeing is based on chemical and physical reactions that, being reversible, create a state of equilibrium. This state and the rate at which it is established are a function of the dyeing temperature.

The rate of diffusion of dye into the fiber is much greater at high temperatures than at low temperatures, and usually the advantages of such diffusion outweigh the disadvantages of a somewhat faster exhaust rate. At times, however, it is advantageous to start dyeing at a low temperature in order to obtain a slow rate of exhaust and to complete the dyeing process at a high temperature to obtain the leveling effects of a high rate of diffusion.

Preparation Is Important

Proper preparation of the yarns is essential for satisfactory results. There is evidence to indicate that dyehouses lose 50% or more of potential production as a result of faulty yarn preparation.

There are five points that have a decided bearing on good package dyeing:

1. **Weight.** The greater the weight, the greater the production.
2. **Dimension of the package.** The distance between the dye spindles will determine the package diameter.
3. **Yarn count.** Hard yarns must be wound looser than soft yarns.
4. **Angle of the wind** to some extent controls the passage of the dye liquor through the yarn. The dye liquor should not go through holes in the package but through the yarn itself.
5. **Density.** The density should be as even as possible.

Any increase in yarn resistance retards the rate of flow; and naturally the more flow of liquor through the package, the more even the dyeing. Package equipment must be equipped with enough pump and motor capacity so that 3½ to 5 gals. of dye liquor per minute will pass or filter through the package to give satisfactory results.

Proper winding of the package is of primary importance because

the best conditions and techniques in the dyeing itself will not compensate for a poorly wound package.

There are four popular types of yarn packages or yarn holders in use:

⅜-in. perforated paper tubes
1⅜-in. perforated metal tubes
1⅜-in. spiral springs
2½-in. Barber-Colman dye tubes

Sometimes a cotton sock is used on all these tubes, especially the spring with a 1⅜-in. hole. A rubber band placed on each end of the 1⅜-in. tube can be used instead of the usual knitted sock.

The yarn traverse on the tube is approximately 6 ins. and the over-all length of the tube approximately 6¾ ins., except Barber-Colman tubes, which are 3⅝ ins. in length.

Select Dyes, Assistants Carefully

There are certain precautions that must be taken before successful dyeing can be produced on any type of machine. Package dyeing employs a short liquor ratio anywhere from 8 to 1 to 12 to 1, making a very concentrated dyebath; so every effort must be made to prevent the color from going on too rapidly or uneven dyeings will result. The proper selection of dyes plus compatible dyeing assistants is very essential.

Serious consideration should be given to the selection of the wetting agents. Some wetting agents and dispersing agents for certain dyes, especially vats, may tend to coagulate or enlarge the particle size and cause precipitation during the pigmentation. Uneven dyeing will result, especially if the dye is a fast-exhausting type.

The exhaustion from a short liquor is greatly accentuated because a filtering action takes place as the dye liquor circulates through the package. Therefore it is essential to select colors with the same rates of exhaustion plus favorable dyeing assistants compatible with the dyes being used. Care in selecting dyes and assistants is one of the most important factors in the success of package dyeing.

Dyes selected for pressure dyeing must be highly soluble to facilitate penetration. The use of good dispersing and wetting-out agents such as the sodium lauryl sulfates, sodium alkyl sulfonates, or amide condensates will increase solubility and create better distribution of the dyes through the package.

Here's a Formula

The following formula has been used repeatedly in successful precision dyeing and is an example of the practicability of the method when suitable dyes and assistants are combined. The formula produces a Lucerne Blue on 500 lbs. of 40/2 C. P. yarn, dyed at a 12-to-1 ratio.

2½% Indanthrene Blue G.C.D. (C.I. No. 1113)
2¼ lbs. dispersing agent in expansion tank
1 lb. dispersing agent in stock tank
2 lbs. wetting-out agent in stock tank
From outside-in run:
Pigment at 155° F. for 35 mins.
Add 40 lbs. caustic slowly (outside-in)
Run 15 mins.
Add 35 lbs. hydro
Run 1 hr.
Rinse with two cold rinses
Add 1½% peroxide cold, bring to boil, run 20 mins.
Add 1% sodium alkylaryl sulfonate

The dye and dispersing agents are thoroughly mixed in the expansion tank with a portion of the total water that will be used in the dyeing. The mixture is heated to 155° F. and pumped through the dry yarn. Meanwhile, the additional dispersing and wetting agents are introduced into the stock tank with the balance of the water required to make up to 12-to-1 ratio. The total mix is then run 35 mins., and caustic and hydrosulfite are added.

The peroxide bath is used as an oxidizing agent; and in the final rinsing, softeners are added to overcome any tendency to harshness. Choice between anionic or cationic softeners will depend on requirements because yarns for knitting may demand a different finish from yarns designed for weaving.

Oxidizing Agents

Formulas for volume of 40 to 80 gals

Sodium bichromate..2 to 6 lbs.
Acetic acid 56%..½ to 2 gals.
Temperature F...120 to 212°

Sodium perborate..2 to 6 lbs.
Acetic acid 56%..½ to 2 gals.
Temperature F...80 to 140°

Hydrogen peroxide (100 vol.).....2 to 4 lbs.
Acetic acid 56%..½ to 2 gals.
Temperature F...80 to 140°

Sodium chlorite...¾ to 2 lbs.
Bicarbonate of soda .....5 to 15 lbs.
Temperature F...80 to 140°

Ammonium persulfate .....2 to 5 lbs.
Acetic acid 56%..½ to 2 gals.
Temperature F.....80°

Properties of Agents

Rate of oxidization: Sodium bichromate most rapid. Others generally slower, though this depends a great deal on temperature and concentration. Ammonium persulfate is particularly slow since it should be run at a low temperature.

Development of oxycellulose: Sodium bichromate is not likely to form oxycellulose. Formation is possible with all the others if temperature, concentration, and acidity or alkalinity of bath are not reasonably well controlled. A lowering of breaking strength of the fabric may result.

Shade change: Shade not affected over rather large variations in concentration or temperatures with sodium bichromate. Loss of depth or dulling of shade can occur if these factors are not controlled with the other materials.

Fastness: There appears to be little difference in fastness to light, washing, chlorine, etc. of any of the oxidizing agents mentioned when they are properly applied.

Ease of removal: Sodium bichromate is difficult to wash out and leaves goods harsh and nonabsorbent. The other four oxidizing agents wash out readily and leave goods soft and absorbent. The ease of rinsing of sodium perborate, hydrogen peroxide, sodium chlorite, and ammonium persulfate is of considerable value to dyers who use the pad-jig method, as the number of ends of wash can be decreased and production increased.

Acid Cracking Treatment for Wool Waste Water

The acid cracking treatment is the most widely used method to remove wax and grease from scouring liquors. There are several variations of the method. Here's a typical setup:

The scouring liquors, which are sometimes diluted with effluent from other parts of the mill, are run into large tanks that serve for storage and sedimentation. Pipes at several levels in the tanks reject the sand that collects at the bottom.

The liquors are passed through a coarse filter to remove fibers and large pieces of vegetable matter before passing to the cracking tanks. Sulfuric acid is added to reduce the pH to 4, and the mixture is agitated with compressed air or paddles.

Up to 20% of the sulfuric acid is sometimes saved by using calcium salts as cracking assistants. The liquor is allowed to stand for several hours after the acid is

added to let the grease settle. The liquor floating on the surface is drawn off and run to waste.

The sludge is pumped to hot storage tanks and then to steam-heated filter presses. Pressure in the presses is kept to 60 lbs. per sq. in. and the temperature to 80° C. Water and wax pass through the filter and are collected in a vessel that separates the hot wax by allowing it to overflow into storage tanks.

The residue in the filter presses may contain up to 20% grease, which cannot be economically pressed. This residue is sometimes used for fertilizer.

Pad-Dyeing Polyamide and Polyester Fibers

Low-temperature pad dyeings that are free of warp streaks are possible on polyamide-fiber fabrics.

The process is based on a water-in-oil emulsion carrying the Vialon (premetallized) colors in a solution in the water phase of the emulsion.

The basic solution of dye and emulsifying agent is made up as follows:

100 to 200 grams Lumulsol F
10 to 100 grams Vialon (premetallized) dye
Water to make 1,000 grams

The emulsifying agent (Lumulsol F) is first mixed with half its weight of water and stirred with a paddle until a smooth paste is obtained.

The mixture is put under a high-speed mixer and diluted further with a portion of the water, and the dissolved dyestuff is stirred in. The dyestuff should be cooled to 35° C. before it is added to the mix.

Dimethyl formate is added to the mix to increase dye solubility.

The mixture of dye emulsifier, solvent, and water is diluted for use by stirring in turpentine substitute.

Horizontal Pads Work Best

The emulsion is applied preferably in a pad that has its rolls mounted horizontally. The pad rolls should be made of a synthetic rubber that is resistant to petroleum-based solvents such as gasoline or benzene.

After padding, the fabric is dried in a flue dryer with heated air or by infrared units. The goods should be guided into the dryer with as few rollers as possible to prevent pick-off of the dye emulsion.

The dried goods are finally put in a steamer at 30 lbs. pressure for 20 mins.

An alternate way of developing the color is to work the dyed and dried goods on a dye jig in boiling water at pH 5 for 30 mins.

It is also possible to develop and fix the color after a preliminary drying by heat treatment similar to that used in heat setting fabrics for dimensional stability.

A variation on the water-in-oil emulsion method is based on including proprietary materials in the mix that are good dye solvents and have a swelling action on the polyamide fibers. A typical formula is:

40 to 100 grams Sesolvan NK
100 grams Texapret C
3 grams Etingal A
10 to 100 grams Vialon (premetallized) dye
Water to make 1,000 grams

The dye is dissolved in a portion of the water and the Sesolvan NK. The Texapret C is dissolved in another portion of the water, and this solution is added to the dye solution. No special precautions are necessary to get a good working mixture.

The solution works well in any conventional pad, but any rubber rolls in the system should not be gasoline-resistant because such rolls tend to swell in the presence of Sesolvan NK.

After the goods are padded, they are dried and developed as outlined previously.

How Polyesters Are Dyed

The polyester fibers can be padded with a water-in-oil emulsion similar to that used for the polyamide fibers.

A formula that has produced good results is:

10 to 150 grams Lumulsol F
10 to 60 grams Celliton (disperse) dye
Water to make 1,000 grams

The Lumulsol F is first mixed with half its weight of water. Then some more water is added to reduce viscosity; and the mix is stirred mechanically at 800 to 1,000 rpm. while the dye solution, cooled to 35° C., is added.

The viscous paste formed at this point is diluted with turpentine substitute, which is stirred in manually.

The final working solution is padded on, the goods are dried, and then they are passed through a heat-setting tenter at 215 to 220° C. to fix and develop the shade.

A final clearing treatment is given the goods by treating them for 20 mins. at 70° C. in a solution of:

2 grams per liter hydrosulfite
2 ccs. per liter 38° Bé. caustic soda
1 gram per liter Nekanil AC Special

The treatment removes unfixed color and also clears up whites.

From a paper prepared by Dr. A. Wurz, Badische Anilin & Soda Fabrik, Germany.

Dyeing Nylon by the Chemnyle Method

The Chemnyle method of dyeing is simple and requires no profound technical knowledge for its application. The filament-nylon goods are prepared conventionally. They are then treated for a period of 10 mins. in from 2 to 3% Chemnyle dyeing assistant, 2% Triton X-67, and formic acid to provide a pH of approximately 3.5.

The recommended dyestuff solution is added to the bath, and the dyeing is carried out at 190° to 200° F. After color matching, the dyeing is washed off at 160° F. If 160° F. washfastness is required, the goods should be aftertreated in the recommended fixing agent for the specific dyestuffs. Katanol 0-50 and Chromofix B are among those that have been found useful.

Chrome dyestuffs may be used to great advantage in shades ranging from light medium to black. The colors are chromed by conventional methods to give good washfastness at temperatures ranging from 160° to 212° F.

Dye Selection Is Important

The question of dyestuff selection is important, because it has been established that there are what may be classified as slow-, medium-, and fast-drawing colors; and although it is preferrable to use dyestuffs from a given classification, mixtures of slow- and medium-, and medium- and fast-drawing types are permissible.

The dyeing rates of individual dyestuffs may be entirely different under Chemnyle conditions than they would be if dyed under normal dyeing conditions.

Dyestuff selection is also very important from the standpoint of colorfastness to light and washing; and it should be pointed out that the use of the Chemnyle process is not an automatic guarantee of good fastness. The dyestuffs that have been chosen through careful research have been found to possess the listed properties.

The Chemnyle process produces wetfastness of a very high order on filament nylon. Lightfastness is equivalent to that normally produced on nylon with the types of dyestuffs listed, which are superior to disperse types. Selected chrome-type dyestuffs can be expected to give lightfastness of from 20 to 100 Fade-Ometer hours. Unfortunately, neutral-dyeing premetallized types have not been found applicable by the Chemnyle method.

Optical bleaches may be applied by the Chemnyle process.

Results obtained from the Chemnyle process show that:

1. Streakiness normally associated with dyestuffs other than disperse types has been virtually eliminated in many cases and reduced to an acceptable minimum in others.

2. Good washfastness has been obtained at 120 to 140° F., which can be boosted to 160° F. by aftertreatments. Many chrome dyestuffs yield excellent washfastness at 160° F.

3. Lightfastness is similar to normal results with acid and direct dyestuffs on nylon and ranges between 15 and 80 hrs. Selected chrome dyestuffs give lightfastness ranging from 40 to 80 hrs., depending on the shade.

4. Shades of a brilliance not normally associated with filament nylon may be obtained, and hand is improved.

From a paper presented by W. H. Hindle at a meeting of AATCC in Greenville, S. C.

PRINTING

Solvents Speed Up Vigoureux Printing

By THE WOOL BUREAU, Dept. of Science and Technology, in TEXTILE WORLD

Table 1—Composition of Printing Paste

Ingredients	For 1 liter	For 10 gals.	Remarks
For Premetallized or Acid Dyes			
Dye	20 to 80 grams	2 to 8 lbs.	
Thickener (Solvitose H4M)	40 to 50 grams	4 to 5 lbs.	Or appropriate quantity of other thickening agent
Acetic acid (100%)	30 c.c.	2½ pints	
Benzyl alcohol	50 to 100 c.c.	½ to 1 gal.	Quantity depends on amount of dye
Anionic wetting agent	5 to 10 c.c.	½ to 1 lb.	Optional
Water	850 c.c.	8½ gals.	
Print Pastes for Chrome Dyes			
Dye	20 to 80 grams	2 to 8 lbs.	
Thickener (Solvitose H4M)	40 to 50 grams	4 to 5 lbs.	Or appropriate quantity of other thickening agent
Chromium fluoride	30 to 60 grams	3 to 6 lbs.	Quantities refer to solid
Acetic acid (100%)	30 c.c.	2½ pints	
Benzyl alcohol	30 c.c.	2½ pints	
Leveling agent	5 c.c.	8 oz.	
Water	850 c.c.	8½ gals.	

TYPICAL PRINT PASTES for three classes of dyes that can be printed by the method described are given above.

Table 2—Steaming Time for Dye Fixation

Pressure Psi.	Temperature ° F.	Temperature ° C.	Time (mins.) for Premetallized dyes 20 to 30 grams per 1. 40 to 50	Time (mins.) for Acid dyes 80 grams per 1. (black) 100 to 120	Time (mins.) for Chrome dyes 20 to 80 grams per 1.
0	212	100	12	35	60 to 90
3	221	105	10	25	40 to 50
5	227	108	8	20	30 to 40
7	232	111	6	12	20 to 30
10	239	115	4	7	10 to 15
15	250	121	3	4	5 to 10
20	259	126	2	2	2 to 3
30	274	135			

APPROXIMATE STEAMING TIMES to get 95% color fixation are listed above. Individual dyes may require more or less time to get the same results.

By using benzyl alcohol as a dye solvent and increasing the pressure at which the printed sliver is steamed, vigoureux printers can get 95% color fixation in 5 to 20 mins.

Premetallized dyes work particularly well in this method, and many acid colors can also be used. Some of the chrome dyes that are less alcohol-soluble can be worked by this procedure if a leveling agent is included in the dye paste.

How Pastes Are Made

The dye and thickener are mixed together and added to the previously mixed liquids. Typical formulations for acid, premetallized, and chrome colors are given in Table 1.

After printing, it is advisable to wrap the sliver bundles with wet covers to avoid drying out the print paste before steaming. If the paste becomes dry, there will be a considerable loss of color value; and adding hygroscopic agents such as glycerine to the print paste will not overcome the effects of drying out.

Pressure Cuts Steaming Time

Steaming the printed sliver at more than atmospheric pressure speeds up color fixation. The steam must be saturated—a normal condition in most plants—and it is important that the print paste contain a volatile acid to avoid yellowing and weakening of the wool during steaming. Table 2 gives typical steaming times for three types of dyes at various pressures.

The steaming chamber should be thoroughly heated before any actual steaming of printed sliver takes place. There is little need to reach pressures much over 3 to 5 psi. for light shades of premetallized or acid colors and 10 to 15 psi. for premetallized or acid blacks and all chrome dyes.

Steam should not be allowed to escape too freely from the steamer because both solvent and volatile acid may be lost before dye fixation is complete.

Different dyes have different rates of fixation; so the figures in Table 2 are only approximate. Many light shades will require less than the suggested time, others may need more. Some acid blacks may require more time than has been suggested.

Tips on Printing Aniline Black

By MALCOLM MACKAY, in TEXTILE WORLD

Aniline black presents few problems to the printer if every step of cloth preparation, color formulation, and aftertreatments is correctly carried out.

In the first place, the goods that are destined for aniline black must be thoroughly boiled out and bleached. If the bleaching is done with chlorine, adequate souring to remove traces of chlorine is necessary.

Pink spots in white areas of the print are apt to develop from aniline fumes if there is any trace of chlorine left in the goods. While it is true that a strong alkaline soaping will usually

remove the pink tinge, it is better to avoid the trouble than have to correct it.

Peroxide bleaching also should be followed by souring or alkaline resist spots may develop. These spots generally respond to acid ageing but again should not be allowed to develop.

Here's a Standard Formula

The following formula for an aniline-black print paste has been successfully used in a number of plants.

A. 9 lbs. sodium ferrocyanide
4½ lbs. sodium chlorate
4 gals. water

The chemicals are boiled in the water until they are dissolved. Then strain the solution into:

8 gals. thickener

B. 12½ lbs. aniline salt
3 gals. water

The water is boiled and poured onto the salt; then solution B is strained in A after both have cooled and just before sending to the printing machine. At this point add:

2 to 4 pints Kollamine A
1 to 2 pints Glycecine A (thiodiglycol)

The sodium ferrocyanide may be replaced by potassium ferrocyanide for better print-color stability.

This formula is suitable for heavy goods such as flannels or corduroys. The volume may be altered with thickener to suit other fabrics; but it is important to maintain the proportions of ferrocyanide, chlorate, and aniline salt.

If too much sodium chlorate is present, the black tends to turn greenish. An excess of ferrocyanide will produce a blue black. During the ageing process, unbalanced formulas do not convert all the aniline salt and free HCI is produced that tenders the fabric.

Choose Thickener Carefully

Considerable care should be given to the choice of the thickener. It should be inert to heavy-metal salts and not sensitive to strong acids. Sodium ferrocyanide is a heavy-metal salt, and in addition there is a small amount of ferric chloride formed as the mixture attacks the doctor blade during the print run.

If the thickener is sensitive to heavy metals, it will tend to build up on the doctor blade and can be productive of feathering and eventually will cause streaks.

Kollamine A is added to prevent tendering of the cloth. It combines with any free hydrochloric acid that is present even in well-balanced formulas.

The Glycecine A provides a lubricating film on the doctor blade and helps to eliminate pitting of the edge.

Color combinations that include alkaline pastes running ahead of the aniline black will eventually cause the aniline-black paste to form a very hard build-up on the doctor blade and print roll. This effect can be minimized by adding 1 to 4 oz. per gal. of phenol to the black mix. The phenol forms a soluble product with the carried-over alkali.

Wooden tubs are satisfactory for the aniline-black paste, but metal tubs and even some types of stainless steel are strongly attacked by the acid oxidizing mix. The reaction can be severe enough to ignite the print paste.

Great care should be exercised in straining the aniline-black print paste because it is difficult to see while it is being printed, and foreign matter can cause doctor streaks that will ruin much yardage before they are seen.

Time Drying and Ageing

Aniline-black prints should be dried evenly and not overdried or pinkish areas will develop in unprinted portions of the cloth cloth weighing up to 2.00 yds. per lb. Overloaded trucks may as a result of the breakdown of the aniline compound.

Trucks should not be packed with over 600 to 700 yds. of overheat and burst into flame from spontaneous combustion.

The agers should be ready to take the printed goods without more than a 30-min. time lag. If goods pile up, they should be swung off into another truck to prevent a buildup of heat.

The ageing can be done with neutral steam or by acid ageing. There should be an adequate volume of steam and good ventilation to remove the breakdown products that can stain white grounds. Temperatures should be kept to 208 to 212° F.

After ageing, the black areas should be a dark green.

After ageing, the goods should be oxidized and soaped within 30 mins. Long layovers can cause tendering from the free hydrochloric acid that has been released in ageing.

The color is oxidized to its final shade of true black by running through a bath of sodium bichromate and acetic acid. The goods are squeezed out and skyed, rinsed, and finally given an alkaline soaping and rinsed out into trucks. None of these baths should be run at over 120° F. or the black will develop a bluish cast.

Printing imperfections such as light streaks in the aniline black can be removed by padding the goods in a weak solution of potassium permanganate, followed by a pass through a solution of oxalic acid or soduim bisulfite. The black will turn green but can be restored by reoxidation with bichromate and acetic acid.

Some plants prepare goods before printing with a weak solution of sulfonated castor oil, which will intensify the shade of black.

FINISHING

How Nappers Work—and How To Work Them

By RICHARD C. FRANKLIN, in TEXTILE WORLD

Modern napping machines are of two types, single acting and double acting. The single-action napper carries worker rolls that all revolve in a direction counter to that of the fabric but are carried on a cylinder that revolves in the same direction as the fabric. The points of the wire clothing of the worker rolls point in the direction of rotation of the cylinder. The fabric enters the machine at the front and travels in the direction of the cylinder's rotation (Fig. 1), p. 116.

By regulating the variable-speed drive, a rolling-contact condition can be established between the points of the wire and the cloth to be napped. The rolling-contact condition is known as zero energy. When the speed of rotation of these worker rolls on their axis is reduced, napping begins.

This situation is called positive energy because the points of wire now are traveling at a little faster linear speed than the cloth and consquently are raising the fibers of the cloth.

If the cloth were allowed to hug the rolls on a single-acting napper with the wire ends all pointing in the same direction, the cloth would be torn and ripped the minute napping began; so the cloth is fed over contact rolls to permit from two to four tangent contacts on the cylinder.

How Double-Action Napper Works

The double-acting napper has begun to take the place of the single-acting napper because it is more versatile in its raising action.

In an 18-roll double-acting napper, nine rolls are driven from one variable-speed drive and the other nine rolls are driven from another variable speed drive (Fig. 2), p. 116.

Two variable-speed drives are necessary on the double-acting machine because one set of worker rolls is wound with wire clothing pointing in one direction, while the other set of rolls is

wound with the wire clothing pointing in the opposite direction.

The action of the pile-worker rolls is the same as the pile-worker rolls in the single-acting napper; that is, when slowed down, they begin to pluck the fibers from the cloth.

The other set of rolls is known as the counterpile-worker rolls. The rotation of the cylinder nullifies the plucking action of the counter-pile-worker rolls. To restore this action, the speed of these counter-pile-worker rolls on their own axis must be increased.

In a double-acting napper, the cloth is not held against the cylinder by contact rolls but lies directly on or hugs the napping rolls.

The pile- and counterpile-worker rolls create a balanced nap when they are napping into the cloth with approximately the same energy, which usually produces the best napping results. The versatile action of the double-acting napper allows greater energy to be exerted by either the pile-worker rolls or the counter-pile-worker rolls.

It is by increasing or decreasing this energy between the wire points and the cloth that different napping results are obtained. In general, more pile energy produces a loftier nap, while more counterpile energy produces a shorter, thicker nap.

How Felting Is Done

When the nap of the fabric is lofty, as in a blanket, it is necessary to regulate the speed of the worker rolls so that their peripheral speed in feet per minute is slower than the cloth speed in feet per minute to produce this tucking or felting action. The action of the wire clothing in this case is like a needle loom. It pushes the raised fibers back into the cloth and

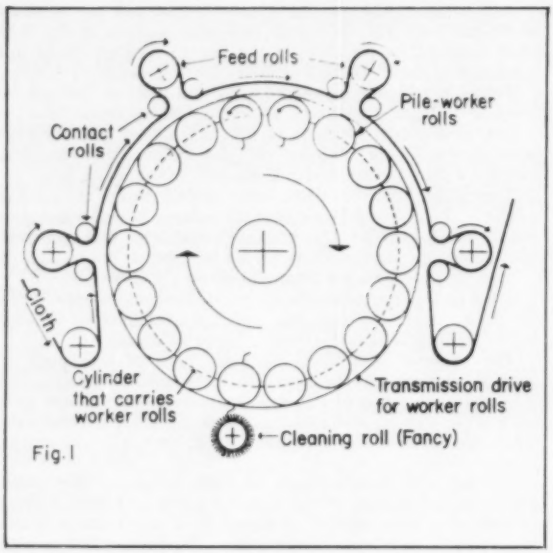


Fig. 1

IN A SINGLE-ACTING NAPPER, all worker rolls revolve in the same direction and the hooks of the wire clothing point opposite to the direction of rotation of the worker rolls.

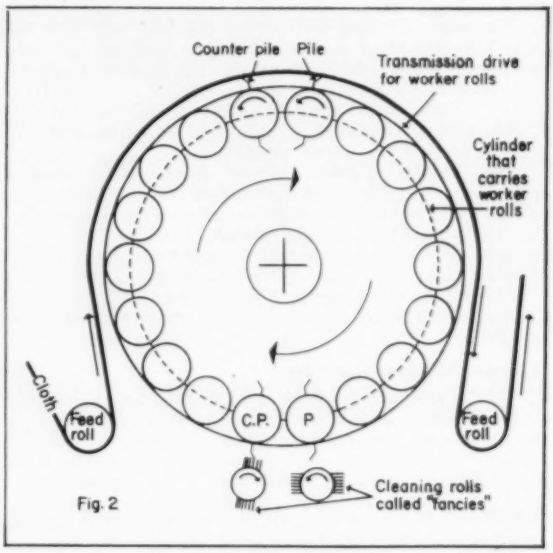


Fig. 2

IN A DOUBLE-ACTING NAPPER, alternate worker rolls are driven separately and the clothing is alternately pointed toward and away from the direction of the cloth.

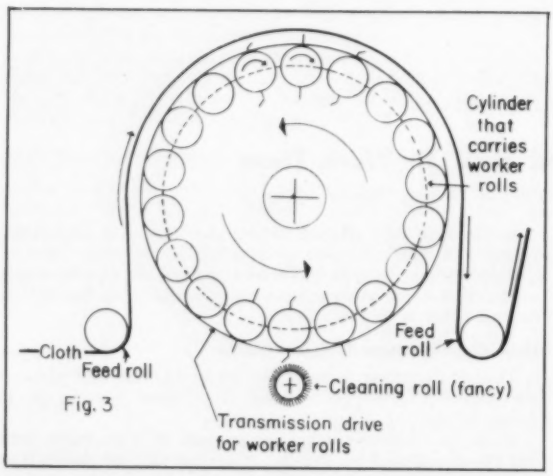


Fig. 3

KNIT-GOODS NAPPERS feature straight and hooked wire on alternate rolls, which are separately driven. Also, the direction of rotation of the rolls is the same as that of the fabric.

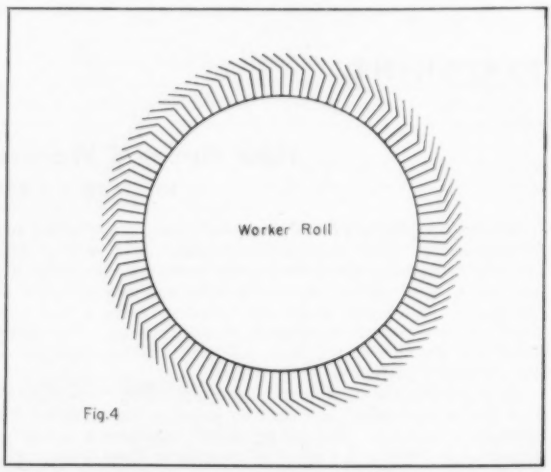


Fig. 4

WORKER ROLLS are covered spirally with strips of heavy fabric in which steel wires are embedded. Points must be kept sharp and even.

makes a smooth finish.

The knit-goods napper differs from the standard double-acting napper in that the cylinder that carries the worker rolls rotates toward the front of the machine (Fig. 3) or against the direction of the cloth.

Half of the worker rolls are driven from one variable-speed drive and the other half from another variable-speed drive. One set of worker rolls, sometimes called traveler rolls, is wound with straight wire, and the other set with hooked wire.

The hooked wire gives a counterpile action in napping; but because of the way it is wound on the worker rolls, it also urges the cloth through the machine. This action helps establish the right tension for napping loop fabrics.

In order to nap efficiently, it is necessary to control and accurately indicate (1) cloth speed, (2) cloth tension, (3) pile energy, and (4) counterpile energy—all independently.

The most important part of a napping machine is the variable-speed drive that controls the revolutions per minute of the worker rolls. There have been many devices used for controlling this speed including belts, change gears, and hydraulic drives.

How To Control Results

Because the wire clothing on the worker rolls of a napper performs a raising action with respect to the cloth or fibers to be raised (see Fig. 4), the speed at which the wire is forced into the fibers is a very important factor in napping. If the wire is forced too fast, it rips and tears the fibers; and if it is forced too slowly, no napping results.

For easy-to-nap fabrics, the positive-energy settings are low. For harder-to-nap fabrics, the positive-energy settings are higher to maintain the optimum raising speed of the worker rolls.

The relative speed between the points of wire and the cloth to be napped is usually fairly small when compared to the cloth speed or the cylinder speed. This relative speed for most fiber raising, for example, usually doesn't exceed 30 to 40 ft. per min. Because of these relatively small surface-speed changes, the energy applied to the worker rolls is extremely important for most efficient napping.

Certain qualities of the wire clothing wound on the worker rolls are especially important:

1. The wire must be set into its backing evenly and must have a sharp needle point.
2. The wire must be of even height.
3. The wire must be strong enough to withstand the torque developed with hard-to-nap fabrics.

Corrosive salts or other chemicals, if present in cloth to be wet-napped, are destructive to regular wire. Stainless-steel wire is resistant to some, though not all, corrosive chemicals and is somewhat softer than steel wire.

Care should be exercised to keep the points of the wire sharp. The wire may be sharpened directly on the roll by a special grinding machine made for that purpose.

Here's a Typical Routine

The general procedure for setting up napping routines could be outlined something like the following:

1. Breaking runs. The first one or two runs on a napper are usually the most important in developing the desired nap. In making these runs, it is necessary to use enough energy to make the worker rolls turn against the cloth with the most efficient raising speed.
2. The intermediate or raising runs usually are used to develop the type of nap desired. By using more counter-pile energy than pile energy, a shorter, thicker nap is usually produced. By using more pile energy than counterpile energy, a long, loftier nap is produced. By varying these two energies, different gradations of these effects can be produced.
3. The smoothing or finishing runs usually discipline the raised fibers by either further limited raising action or felting or tucking action. Different combinations of these actions can be used to produce different effects.

There are a few common-sense ideas that will aid in napping:

1. The fabric to be napped should be flat and free from wrinkles.
2. The fabric should be stressed evenly from selvage to selvage.
3. The use of appropriate softeners on some fabrics is advisable.
4. A collecting system to keep the flock (lint) from flying should be installed. This collecting system is especially important in napping man-made fibers, blankets, and cottons.
5. The working width of the napping machine should not be too much greater than the width of the cloth.

How to Make Sulfated Oils and Tallow

By **WALTER FREDERICK**, in TEXTILE WORLD

Costs for finishing materials can be reduced if three of the most commonly used products are made at the plant. These are sulfated tallow, sulfated castor oil, and sulfated olive oil. The only special equipment needed is a cast-iron or glass-lined tank large enough to hold the fat or oil during the sulfation and final neutralization. The tank should be fitted with a cooling coil, a heating coil, and a stirring paddle.

Another tank of ordinary steel can be used to carry the Glauber's salt and caustic solutions necessary to finish the product. A smaller lead-lined or cast-iron tank will do to hold the strong sulfuric acid. Both tanks should be mounted to permit gravity flow of the contents to the sulfating tank; but if necessary, these solutions can be pumped to the sulfator.

How To Sulfate Tallow

A known weight of a good grade of inedible tallow is loaded into the glass-lined tank and warmed to 105° F., or just to the melting point. Then 12 to 14% of 66° Bé. sulfuric acid, based on the weight of the tallow, is run in over a period of 1 hr. The temperature should not be permitted to rise over 110° F. during this period and can be controlled by the cooling coil.

The mix is stirred for 3 hrs. and then is neutralized with a caustic-soda solution. Congo-red paper can be used to indicate the point at which all excess sulfuric acid has been neutralized.

This first neutralization can be done by pumping the tallow-acid mixture into a caustic solution calculated to take care of excess acid and at the same time contain enough water to produce a product of the desired fat content.

Some operators prefer to add a 20% solution of caustic directly to the tallow-acid mix. The end-point of the neutralization is checked with Congo-red paper, which turns blue in the presence of a trace of mineral acid.

During the neutralization, the temperature should be 120° F., which will most likely be provided by the heat of reaction.

How the Mix Is Finished

At this point, the mix should be fitted or adjusted to the percentage of fat wanted by the finisher. Usually tallow is finished off at 50% moisture, but at this figure it must be remembered that there is 10 to 12% Glauber's salt included in the mix as a result of the neutralizing process and the final adjustment of the mix to a pH of 8 with 20% caustic-soda solution.

This last step is merely a continuation of the neutralizing process and saponifies some free fatty acid to make the product more soluble.

Usually a small amount of citronella, myrbane, vanillin, or formaldehyde is added to the finished product to mask the fatty odor.

The sulfated tallow is stirred and cooled until it is nearly set to prevent the formation of large crystals of Glauber's salt. The product is run into clean drums or barrels and is ready for use.

Castor oil, olive oil, or mixtures of olive oil, soya-bean oil or peanut oil are sulfated as follows:

To 2,000 lbs. of oil, cooled to 25° C., add over a 6-hr. period 500 lbs. of 66° Bé. sulfuric acid. The temperature must be kept below 30° C. by means of ice water in the cooling coil.

After all the sulfuric acid has been added, stirring at 25 to 30° C. is continued for 6 to 12 hrs. The time will depend on the oils being processed but should be continued until a sample of the oil dissolves in water to give a clear or slightly hazy solution.

Then 1,000 lbs. of a 20% Glauber's salt solution is run into the oil-acid mix and stirred for 15 mins.

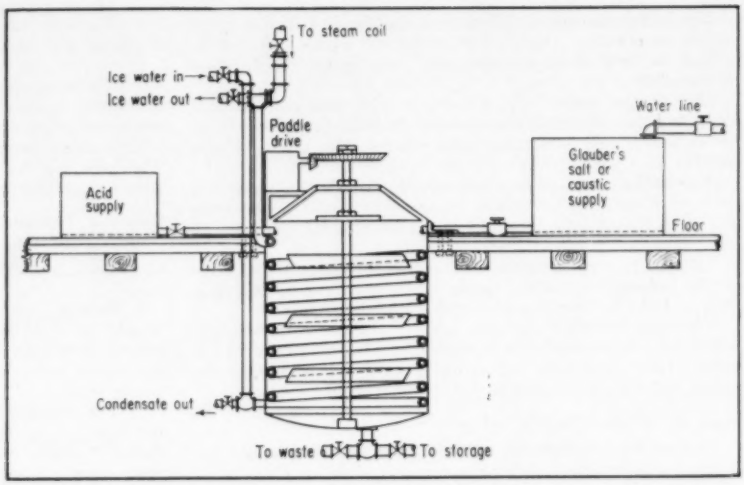
The mixture will separate completely into two layers within 2 to 4 hrs., leaving the unreacted acid and salt solution at the bottom of the tank, from which it is run to waste.

The mix can be fitted by adding enough of a 20% solution of caustic soda to the oil to bring the pH to 8. This product will contain approximately 50% fat.

If a 75%-fat product is wanted, add only enough caustic solution to neutralize any free sulfuric acid left over from the salting-out process. Congo-red paper is used to indicate the end-point.

The usual analysis for moisture, SO_3 content, ash, total fat, and combined alkali should be made to establish standards by which the products can be judged. After several batches have been made, the tanks can be marked so that the quantities of oil or caustic solutions that are necessary for each lot can be judged in a short time.

This general procedure can be applied to mixtures of vegetable oils with mineral oil. The amount of sulfuric acid used should be based on the vegetable-oil content only because the mineral oil will not be affected by the sulfuric acid.



SULFATED TALLOW OR OILS can be made with relatively simple equipment set up as shown here. The sulfating tank should be glass-, lead-, or plastic-lined. The acid-supply tank should be made of similar acid-resisting material. The Glauber's salt or caustic tank may be made of ordinary boiler plate.

Effect of Curing Conditions on Resin Finishes

By SCOTT H. FOSTER, in TEXTILE WORLD

In order to determine the effect of curing conditions on wrinkle recovery and the loss in tensile and tear strength on an 80x72 cotton fabric, the following experiments were made.

A cyclic ethylene-urea resin (CEU) and a methylated methylol resin (TMM) were the basic resins used in the tests. No other materials except the catalysts were included in the formulas.

Fabric samples were treated with the resins in amounts that gave 2, 4, 6, 8, 10 and 15% add-on of resin. Drying was constant at 3 mins. at 200° F.

An afterwash, followed by overnight conditioning, preceded all tests.

Trials were made to show the effect of time and temperature of cure and the effect of varying the amount of catalyst.

Effect of Curing Temperature

For the CEU resin, curing temperatures in the neighborhood of 270 to 290° F. give the best all-round results in wrinkle recovery and residual tensile strength. The lower temperature favors tensile strength.

For fabrics treated with the TMM resin, curing temperatures up to 330° F. are required to get a degree of wrinkle recovery comparable to the CEU resins at 290° F.

Primary tests to evaluate the effect of curing temperature were made with resin formulas containing 10% organic-amine catalyst based on resin weight.

To find the effect of varying amounts of catalyst, trials were then made with 5, 10, and 30% catalyst based on the weight of CEU resin.

Results indicated that wrinkle recovery is not helped by catalyst in excess of 10% where resin add-on exceeds 3%.

Tensile- and tear-strength loss tends to increase as excess amounts of catalyst are added.

With the TMM resins, at curing temperatures of 330° F., the higher amounts of catalyst appear to improve wrinkle resistance. Tensile and tear strengths tend to become lower as catalyst concentration increases.

Effect of Curing Time

Tests made on fabrics treated with CEU resin with varying amounts of catalyst and resin and cured at 290° F. showed that with curing times of 1½, 3, and 6 mins. there was no difference in wrinkle recovery, tensile loss, or tear loss. The same holds true for the TMM resins.

Using curing conditions most favorable to each resin, samples were treated with varying amounts of CEU and TMM resins. Wrinkle-recovery tests were initially better for CEU resins, but after five washings the wrinkle recovery dropped nearly to the level of the laundered TMM resin-treated fabrics. TMM resins appear to lose less in wrinkle-recovery properties than do CEU resins.

Tensile strength of the samples was slightly lower with CEU resins, but after five washes the tear strength of samples treated with CEU and TMM resins was essentially the same.

Conclusions are that each resin has an optimum curing temperature. Variations in the amount of catalyst are of less importance in amounts over 10% of resin solids. Extended curing times are of no benefit.

Finishing Nonwoven Fabrics

Nonwoven fabrics that are destined for other than disposable purposes can be dyed, printed, embossed, and finished on ordinary dyehouse equipment.

Because nonwovens as a class do not have the tensile strength or drape associated with woven fabrics, it is necessary to process them in the open width at lower tensions than can be used on woven fabrics. The end use will in most cases determine the extent of the finishing operations that will be necessary to produce the desired product.

The great bulk of nonwoven fabrics that go into interlinings, upholstery backing, insulation, and coated materials are finished when they come off the production machines on which they are formed.

Two broad classes of nonwovens can be defined. In one case the fabric is held together by an added binder. The other class of nonwovens is bound together by thermoplastic fibers mixed in the blend, which are plasticized by passing the web through heated rolls or ovens. When the web cools, the thermoplastic fibers bind the mass together.

How Color Is Added

For many purposes, color can be added to the binders that are used to hold the web together. There are limitations to coloring by this method. It is not possible to produce deep, evenly colored shades; and in some cases the binding effect is considerably reduced if large amounts of dye or pigments are incorporated in the binder solution. The hand also suffers if large amounts of pigment are added.

Nonwovens that are made of cellulosic materials bound with latices applied by immersion of the web can be dyed by adding color to the bath containing the latex emulsion, but trials should be run to note the effect of the salt content of the dyes on the stability of the latex emulsion.

Many emulsions are sensitive to the presence of even small amounts of electrolytes and will break out under the combination of electrolytic effect and mechanical action at the nip. A two-bath continuous process that uses one pad for color and a following pad for the binder emulsion will cut down the chances of emulsion breakdown.

Binders based on thermosetting resins or solutions of glue, polyvinyl alcohol, casein, or alginates are generally not sensitive to the salt content of dyes and could be expected to tolerate adequate concentrations of dye for most purposes.

Jigs or Becks Can Be Used

If deep shades of good all-round fastness are necessary for the end use of the nonwoven fabric, it is possible to dye them by conventional methods that are used for woven goods. The nonwoven fabric should be strong enough to withstand moderate tension, particularly if jig dyeing is contemplated.

In any case, tensions must be kept at a minimum; and modern jigs with spreaders are a necessity to avoid warpwise creasing. Of course it is not possible to rewet nonwovens that are bonded with water-soluble binders. Neither is it practical to attempt to get solid shades by piece-dyeing methods on nonwovens bonded with waterproof latices.

Nonwoven fabrics can be dyed in dyebecks, but the breast roll should be modified so that the web is teased out to full width and not permitted to fall into rope form. For cellulosic fibers, direct colors, sulfurs, aftertreated directs, or vats can be applied to nonwoven fabrics in becks.

Mixed-fiber nonwovens that use a thermoplastic fiber as a binder may require disperse colors or acid colors to tint the thermoplastic fibers. Acetate or nylon fibers are included in this category, as well as polyamide and polyster fibers designed especially for binding the mass of fibers together.

Where the binding fiber is present in the usual ratio of 10 to 15%, it may not be necessary to dye it as a separate operation unless a truly solid shade is required.

Drying Is Standard

Dyed non-woven fabrics can be dried in loop dryers or any other dryer in which tensions are low. Rugged webs can be tenter dried, but this method is not practical for very light webs. Tenters that are set up for and operated by personnel trained to handle conventional fabrics create more tension than most nonwoven fabrics can stand.

Considerable yardage of nonwoven fabrics is now being printed on conventional roller-printing machines. Here again excess tension must be guarded against. Pigments are largely used to produce the printed designs, but dyestuffs are practical when they are suitable for the fibers involved. Screen-printing methods are also used to decorate nonwoven fabrics.

Surface Effects Possible

Some nonwoven fabrics are designed so that they can be lightly napped to give a soft and pleasing surface.

Embossing a pattern on the fabric is a common decorative step that can be done with conventional embossing machines. Fiber content is important here because the pressures and temperatures must be adjusted to suit the fiber.

Thermoplastic fibers must not be embossed at temperatures near their melting point or at high pressure. It is possible to fuse a thermoplastic fiber at a temperature considerably below its melting point if excess pressure is applied.

Plain calendering is often used to produce glazed surfaces or to compact the fabric prior to coating operations.

How Hand Can Be Modified

The bête noire of nonwoven fabrics is poor drape at adequate breaking strength.

To overcome poor drape, it is possible to work the fabrics in the open width in a dyebeck with a softener added to the bath. The mechanical effect seems to be very important in breaking down fiber stiffness. Some of the weaker bonds are broken in the process, which reduces fabric stiffness.

In addition, binders can be compounded with softening agents to improve draping qualities.

Chemical modification of the nonwoven fabric is also possible after manufacture, but this approach generally depends on degradation of the fiber and must be carefully controlled to avoid excessive loss in strength.

Coating Is Important

Nonwoven fabrics are being used in great quantities in automobile-upholstery items such as door paneling, scuff pads, and seat bolsters. Several car manufacturers are using nonwoven fabrics as backings for vinyl sheets.

The random-fiber nonwoven fabric provides strength and support to the exterior vinyl sheet and eliminates the need for heavier and costlier backing materials. Latices are used as a bonding agent in the nonwoven fabric itself, which is usually made from cotton or synthetic fibers.

Three methods are used by the converters to combine the nonwoven fabric and the vinyl sheet.

In all three methods, the nonwoven fabric adds thickness to the sheet, increases tear resistance, and aids the soft, pliable hand normally found in an unsupported sheet. The fabric still permits a desirable amount of stretch and recovery in the final structure.

Many colors of vinyl materials are used to coat the nonwoven fabrics.

One method is to apply a coating of vinyl plastic directly on to the nonwoven fabric in a calender. The vinyl dough is fed to the nip, and the distance between the rolls determines the thickness of the coating. The heated rolls fuse the vinyl and adhere it to the backing.

Preformed vinyl sheet is also applied to nonwoven fabrics in a laminating operation. In this system, the vinyl sheet is led past a bank of infrared lamps or other suitable heat source and then meets the pretreated web of fabric just ahead of pressure rolls. The hot materials are slightly fused at the point of contact to produce a secure lamination.

A great deal of nonwoven fabric is consumed in backing for quilted vinyl-faced materials that go into baby-carriage linings, table covers, and the like.

In this type of material, vinyl sheet is led over a layer of wadding that in turn lays on a sheet of nonwoven fabric. The three layers are joined at intervals when an electronically heated die is pressed down on them. Usually the pattern is in the form of lines such as are produced by stitching a conventional quilt.

The nonwoven fabric is generally all cotton bonded with a synthetic rubber.

GENERAL

pH in Textile Processing

The symbol pH is used to define a system of measurement of the active H^+ ions or (OH^-) ions in a solution. The system is based on Arrenhius's theory of electrolytic dissociation, which assumes that acids, alkalis, or salts, when dissolved in water, dissociate or break up into ions. An ion is an atom, or group of atoms, that carries electrical charges. Hydrogen, H^+, is considered to carry a positive charge. Hydroxyl ions, (OH^-), carry a negative charge.

Most inorganic and many organic materials dissociate when dissolved in water, freeing H^+ and (OH^-) ions. If the H^+ ions are more numerous, the pH of the solution will be less than 7. If the (OH^-) ions predominate, the pH will be more than 7. If there is complete balance between these two groups of ions, the pH will be 7. Pure water is an example of this situation; it has a pH of 7.

Sorenson developed the present pH scale, which is a way of expressing the hydrogen-ion concentration and is based on the negative logarithm to the base 10. Another way of putting it is to say that pH is the logarithm of the reciprocal of the hydrogen-ion concentration.

In Table I, the range of values of H^+ ion concentration will be seen to progress according to the logarithmic system.

The thing to remember is that when the pH is less than 7, the solution is acid; when it is over 7, the solution is alkaline. Each whole degree of pH represents a change in intensity of acidity or alkalinity of 10 times the previous or following degree.

But remember, too, that pH is a measure of intensity, or activity. It doesn't tell you how much acidity or alkalinity is present; it tells you only how busy those ions happen to be at the time.

How To Check pH

Several systems of checking pH have been evolved, including titration with chemicals that change color as pH varies (phenolphthalein, methyl orange), proximate estimation by noting the color change of dyes such as listed in Table II, or by using color comparators such as the Lovibond Comparator. Most recent are the methods developed around electrometric systems in which electrodes of various compositions are introduced into the liquid to be tested. By balancing out the electrical characteristics of the instrument itself, very delicate pH measurements can be obtained.

For many practical purposes, pH measurements of sufficient accuracy for processing can be made with compound indicators that change color quite definitely over the entire pH range. Test papers that cover the entire range of pH are useful and available from most chemical supply houses.

The electrometric method is the most highly developed and accurate way to check pH and is not affected by color or turbidity, which affect colorimetric methods seriously. This versatility makes the electrometric method most valuable.

Table I

Hydrogen-Ion Concentration Scale

pH value		Intensity of acidity or alkalinity	
0	Acid	10,000,000	
1		1,000,000	
2		100,000	
3		10,000	
4		1,000	
5		100	
6		10	
7	Neutral	1	(= H^+ ions to 10^{-7} = (OH^-) ions to 10^{-7})
8	Alkaline	10	
9		100	
10		1,000	
11		10,000	
12		100,000	
13		1,000,000	
14		10,000,000	

Table II

Indicator	Range of change in pH	Color		Concentration in %	Number of drops
		Acid	Alkaline		
Methyl Violet	0.1 to 3.2	Yellow	Violet	0.05	3 to 8
Tropaelone OO	1.3 to 3.2	Red	Yellow	0.01	1 to 5
Dimethyl yellow	2.9 to 4.0	Red	Yellow	0.01	5 to 10
Methyl orange	3.1 to 4.4	Red	Orange yellow	0.01	3 to 5
Methyl red	4.2 to 6.3	Red	Yellow	0.02	2 to 4
Neutral red	6.8 to 8.0	Red	Yellow	0.01	2 to 5
Phenolphthalein	8.2 to 10.0	Colorless	Red	0.05	3 to 20
Thymolphthalein	9.3 to 10.5	Colorless	Blue	0.04	3 to 10
Alizarine yellow	10.1 to 11.1	Yellow	Lilac	0.01	5 to 10
Alizarine-sodium sulfonate	10.0 to 12.0	Red brown	Pale yellow	0.01	4 to 16
Tropaeoline O	11.0 to 13.0	Yellow	Orange brown	0.01	5 to 10

The number of drops indicates the amount of indicator to be added to 10 c.c. of the solution under test.

Courtesy "The Ciba Review" No. 112, Ciba Co., Basle

THESE DYES are sufficiently sensitive to changes in pH to be useful in checking many textile processes. Colorimetric methods fail in oxidizing, reducing, or highly colored solutions and are replaced by electrometrc methods.

How To Figure Savings From Heat Exchangers

Many dyehouses and finishing plants do not have any method of reclaiming heat from hot water used in scouring, dyeing, mercerizing, and soaping.

By passing waste hot water from these or other sources through a heat exchanger, very considerable savings can be made in the cost of heating water for processing.

The simplest calculation is to convert the Btus. regained in the heat exchanger to an equivalent amount of steam. An arbitrary figure of steam at 150 lbs. gauge is used as a basis for the calculation.

In a typical installation, hot waste water passed through the heat exchanger at the rate of 150 gals. per min. The exchanger picked up 64 Btus. per lb. from the waste water each minute.

Here's how savings were figured:

$$\left(\frac{150 \times 8.33 \times 60 \times 64}{858} = \right.$$

5,815 lbs. steam per hour from and at 150 lbs. ga.$\Big)$

Where:

150 = gals. per min. flow through exchanger
8.33 = lbs. water per gal.
60 = mins. per hr.
64 = Btus. rise per lb. of water
858 = Btus. as latent heat required to convert 1 lb. of water to steam at 150 lbs. gauge.

How To Crown Rubber Rolls

By A. W. BUECKER, in TEXTILE WORLD

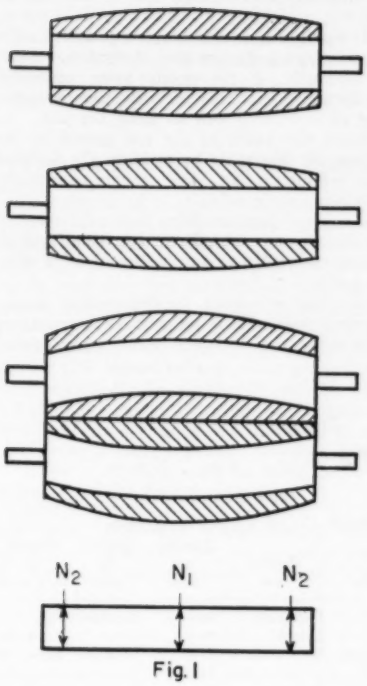


Fig. 1

ROLLS here are properly crowned. At the top, the rolls are shown under no load. At the center, the rolls are shown under load. The core has bent and the extra thickness of the rubber at the center has compensated for the deflection. At the bottom is the pattern made on a carbon paper by a properly crowned nip.

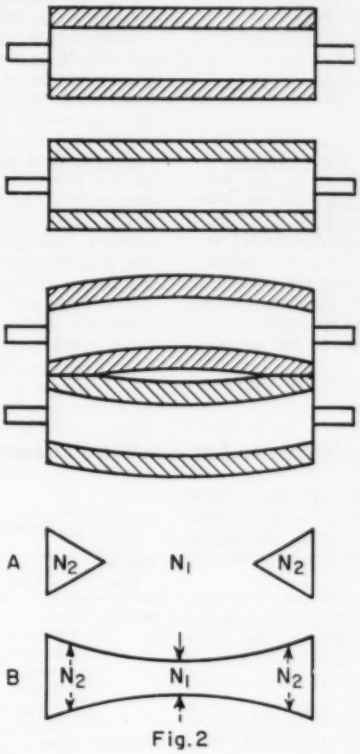


Fig. 2

ROLLS are not crowned in this drawing, and the nip in the center view is badly deformed from deflection of the core. Carbon-paper patterns at A are exaggerated; this type of nip usually shows a pattern represented by B.

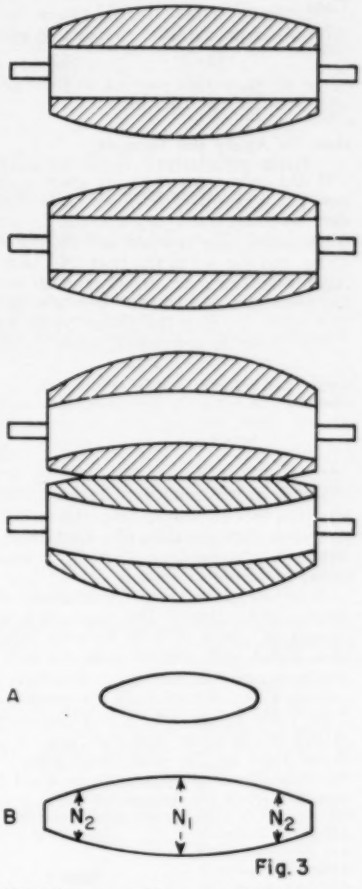


Fig. 3

ROLLS have too much crown. Only the center area—exaggerated at A—will make contact. In most cases the actual pattern would be similar to B.

All the thought and care that go into determining the correct density, thickness, and working pressure of a rubber roll can be canceled out by disregarding the importance of a proper crown on the finished roll.

Crowning compensates for the deflection of the roll core that occurs when pressure is applied to the ends of the core. Each application requires a different crown, because the degree of deflection will depend on the resistance of the core to deflection and the pressures involved. The crown compensates for the deflection of metal and is independent of the hardness of the rubber.

There are several ways to calculate a proper crown, but the most reliable method is derived from the nip widths measured while the machine is under load. The roll may be crowned or not at the time the nip widths are measured, as long as the crown is known.

To obtain nip widths, carbon paper nips are taken across the face of the roll. More-accurate measurements can be taken if the width of the nip is measured from its impression on the carbon paper itself rather than on the backing sheet.

Having determined the nip widths under the desired loadings and knowing the diameters of the rolls, the amount of crown can be determined by applying the following expression:

C = crown to be put into the roll, i.e. the difference in diameter between the center and 2 ins. in from the ends of the roll
N_1 = nip width at center of roll
N_2 = nip width 2 ins. from the ends of the roll
D_1 = diameter of top roll
D_2 = diameter of bottom roll

then

$$C = \frac{(N_2^2 - N_1^2)(D_1 + D_2)}{2 D_1 D_2}$$

or if rolls have equal diameters

$$C = \frac{N_2^3 - N_1^3}{D}$$

As an example, assume that you have two 12-in.-dia. rolls and find that the nip widths are 0.9 in. on the ends and 0.7 in. at the center under the desired load.

Then by the formula, since:

$N_1 = 0.7$
$N_2 = 0.9$
$D = 12$

Then:

$$C = \frac{(0.9^2 - 0.7^2)}{12} = \frac{0.81 - 0.49}{12}$$

$$= \frac{32}{12} = 0.027 \text{ in.}$$

How To Apply the Formula

If the rolls were originally ground straight-face, you would now put a crown of 0.027 in. into the rubber. If the crown were originally 0.030 in., it would be increased to 0.057 in. If the situation were reversed and the nip at the center (N_1) were 0.9 in. and the nip at the ends (N_2) were 0.7 in., your indicated crown would then be –0.027 in., indicating that the nip already contained too much crown. Similarly, if the crown on your roll were 0.030 in., then the proper crown would be 0.003 in.

The crown as determined above is, of course, the combined crown for the two rolls involved. The amount of this crown that should be put into the top and the bottom roll will depend on the individual machine and operation. It is frequently helpful to determine crowns for various loadings so that if you desire to change the loading, then the proper crown for the roll will be immediately available.

Using carbon paper to determine the actual nip widths of a pair of rolls under operating conditions is a method too infrequently employed. Normally, if the goods being processed appear to be uniform in moisture content as they leave the process, it is assumed that all is working well all along the line.

Uneven pressure across the width of the roll caused by insufficient crown will not be detectable by tests on the finished product provided the pressure is not high enough to actually start crushing the web being processed.

The effect of this uneven pressure from lack of crown or excessive loading for the crown used will then become evident only in uneven wear and end-cracking of the rubber-covered rolls, and finally, defective goods.

The time and labor that are spent in determining proper crowns for rubber-covered rolls will be more than compensated for in improved performance and decreased maintenance costs.

Surfactants for Textile Processing

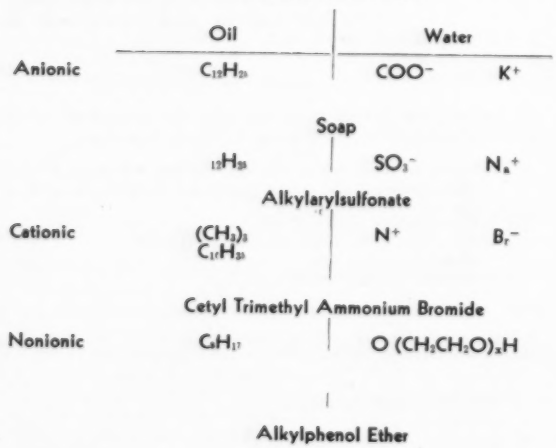
Surface-active agents are chemicals with at least one common property: they all sharply lower the surface tension of water when present in concentrations of a fraction of a percent. Many hundreds of such products have been developed, and many are useful in textile processing.

There are three broad classifications of surfactants—nonionic, anionic, and cationic. The choice of a particular surfactant will depend on where it is to be used. There are so many variations within each class of surfactant that to some extent choice is a matter of trial and error. However, a glance at the accompanying tables will establish a starting point.

In Table 1, the three broad classifications of surfactants are divided in relation to their ionic activity. The components listed at the right are the solubilizing groups. Physical properties of the three classes of surfactants are listed in Table 2. What may be expected of a surfactant at work in processing can be deter-

Table 1

Classes of Surfactants



THREE BROAD CLASSIFICATIONS of surfactants are represented by the diagrams above. The behavior of these typical materials in water solutions can be predicted by the nature of the solubilizing group.

Table 2

Physical Properties of Typical Surfactants

Surfactant class	Chemical type	Physical form	Stability to acids	Stability to alkali	Stability to hard water
Anionic	Soap	Hard paste	Poor	Excellent	Poor
	Sulfated oil	Liquids	Poor	Good	Poor to fair
	Alkylarylsulfonate	Solid or slurry	Excellent	Excellent	Good
	Alcohol sulfate	Liquid or slurry	Fair	Very good	Very good
	Sulfonated amide	Solid	Good	Good	Good
	Petroleum sulfonates	Liquid	Excellent	Excellent	Fair
	Sulfonated ethers	Liquid	Good	Good	Good
Nonionic	Ethers	Liquid	Excellent	Excellent	Excellent
	Esters	Liquid	Poor to fair	Poor	Good
	Alkylolamides	Liquid, wax	Poor to fair	Good	Good
Cationics	All	Liquid, powder	Good	Good	Good

PHYSICAL PROPERTIES of a number of products in the three general classes of surfactants indicate their suitability for specific purposes. Choice of liquids, solids or pastes will depend on the process involved.

Table 3

Surface-Active Properties of Typical Surfactants

Surfactant class	Chemical type	Wetting of cotton	Emulsifying	Suspending carbon	Foaming	Detergency
Anionic	Soap	Fair	Very good	Good	Fair	Good
	Sulf. oil	Good	Very good	Fair	Fair	Poor to fair
	A. A. S.	Very good	Good	Fair	Good	Very good
	Alcohol sulf.	Good	Very good	Fair	Excellent	Very good
	Sulfonated amide	Good	Good	Good	Good	Good
	Pet. sulfate	Very good	Very good	Fair	Fair	Fair
	Sulfonated ethers	Fair	Good	Very good	Good	Very good
Nonionic	Ethers	Good	Excellent	Excellent	Poor	Good
	Esters	Fair to good	Good	Excellent	Poor	Fair to good
	Alkylolamide	Very good	Good	Good	Good	Good
Cationic	All	Good	Good	Fair	Good	Poor

WORKING PROPERTIES—How various surfactants perform in several common applications are indicated in this table. One product may serve several purposes.

mined broadly by looking at Table 3.

In selecting a surfactant from such broad classifications, factors directly affecting the fiber, process, equipment, and the peculiar situations in individual plants must also be considered. There need not be a large number of surfactants required in the plant; many of these products are useful for several purposes. Foaming characteristics are undesirable in high-speed padding or pressure-dyeing operations but may be tolerated or even preferred in a surfactant used as a dye-leveling agent in open machines. The cationic materials generally excel as finishing agents; their detergent value can be bettered by some anionic and nonionic surfactants.

The importance of surfactants in wetting out, scouring, dye leveling, and finishing is such that it is unwise to buy on price alone. Performance for the job involved should be the first consideration because an unsuitable or inferior product often gives disappointing results that require fabric to be rehandled.

Based on a paper presented before the American Chemical Society by Carl Pacifico

Figure Dilution With Pearson's Square

Any degree of dilution of a base product, or solute, with a solvent, or with a solvent containing some of the solute, can be figured by means of Pearson's Square illustrated below.

The quantities involved are set down on the corners of a square, and then two subtractions are made as indicated by the arrows. The left-hand diagram shows that if a solution or suspension contains A% of a solute and it is desired to dilute this with another solution containing B%, to obtain a product containing C% solute, then A—C=the number of parts of B to be used and C—B=the number of parts of A to be used.

Up to this point subtraction is the only mathematical operation required. Of course, if it is desired to use a definite quantity of A or to produce a definite quantity of C, then a calculation of simple proportion must be added to convert the "parts" of A and B to the desired quantities.

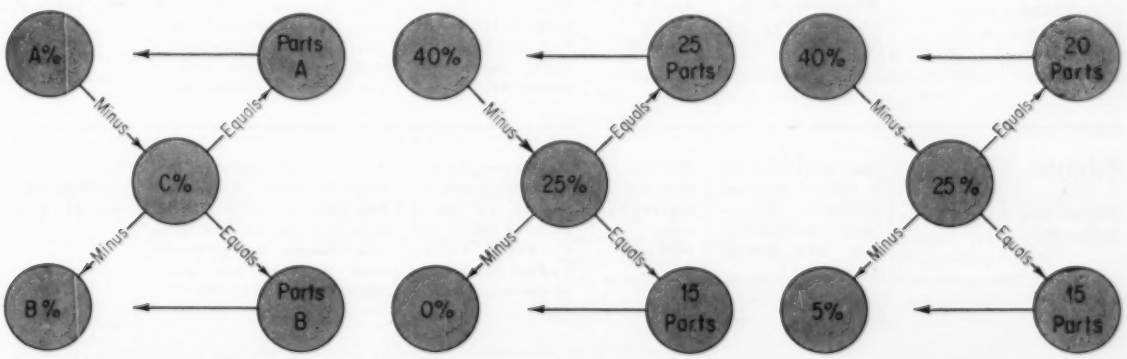
This method lends itself readily to use in the plant because the circles, labels, and instructions can easily be painted on a blackboard for routine use. It should be noted that the method is identical for either volume or weight percentages.

Diagrammed in the center is an example where pure solvent is to be used. If the original solution contains 40% of solute, the diluent contains no solute, and the final concentration is to be 25% solute, then 25 parts of original solution, mixed with 15 parts of solvent, will yield a final concentration of 25%. If the percentages are expressed on a volume basis, then the method can be completely accurate only if there is no volume contraction on adding the solute to the solvent. If the result is to be expressed in terms of weight rather than "parts," then to make 100 lbs. of final solution you need (25/40)100=62½ lbs. of original solution, plus (15/40)100=37½ lbs of solvent.

The right-hand diagram shows the use of Pearson's Square for a case where the diluent contains some of the solute—5% in the example. Use of the method is identical with the first case, but the result shows that 20 parts of original solution must be added to 15 parts of diluent; and for 100 lbs. of final solution you will need (20/35)100=57.2 lbs of original solution, added to (15/35)100=42.8 lbs. of diluent.

By William H. Fischer, in Chemical Engineering

A, B, C = concentrations of initial, diluting, and final solutions.
Case 1—Diluent contains only pure solvent, i.e., B = 0%.
Case 2—Diluent contains some solute, i.e., B = 5%.



Common Rubber-Roll Troubles and Suggestions for Treatment

By DAVE KUNIHOLM, in TEXTILE WORLD

Fault	Causes	Treatment
Hairline cracks	Fatigue, sustained overload, stored too long, improperly stored, too dry, exposed to sunlight	Regrind, reduce load, possibly replace with larger or softer rolls
Deep cracks	Frozen, exposed to ozone, hairline cracks were neglected	Regrind below cracks if possible; otherwise roll must be recovered
Surface cracks near ends	Uneven pressure across roll, overheating, swelling, neglected	Re-cover, correct localized pressure overload
Swelling or mushrooming at ends	Hot bearings or rusted body surfaces	Correct lubrication, regrind or re-cover, cover end of metal body
Ends of roll gouged or deformed	Damaged by sling chains in moving	Protect ends in moving with chain slings; if possible, use belt sling around middle
Grooves or corrugations in roll	Sustained local overload, often from rope fabrics or narrow widths of material	Use moving pin rack or change position of pin rack weekly or daily
Flat spot	Roll was left idle in contact with its mate or was stored on its side	Revolve in hot water for 1 to 2 hrs. If not corrected, regrind. Don't leave idle rolls in contact. In storing rolls, support on journals
Soil on light goods	Dirty roll, or oxidation from contact with brass roll	Clean roll with alcohol or ethyl-free gasoline. If practicable, replace brass roll with other metal or with hard rubber roll
Oxidation or surface hardening	Inactivity; long storage	Regrind

METALLIC-YARN WET-

CONSTRUCTION OF PRINCIPAL TYPES OF METALLIC YARNS	How To Identify	Major Fabric-			
		Singe Desize	Scouring	Bleaching	Mercerizing
Viscose + Metal Foil + Viscose	Burn — smells like paper. Immerse in water—may delaminate. Not soluble in acetone.	May be singed. Avoid desizing if possible—may delaminate	Avoid.	Avoid.	Avoid.
Acetate-Butyrate + Metal Foil + Acetate-Butyrate	Burn — smells like rancid butter. Soluble in acetone, isopropyl acetate.	May be singed or desized by usual methods	May be scoured with mild alkalis and detergents in jigs or becks at 160 to 180° F. Avoid cresylic-acid compounds, caustic soda, heavy nips.	Use low-caustic or silica-free peroxide formulas in one-stage continuous systems; open kiers, jigs, becks satisfactory with low-alkali peroxide formulas.	May saponify film. Make trial runs
Triacetate + Metal Foil + Triacetate	Acetone dissolves film in 30 mins. May delaminate in benzene, methyl alcohol, trichlorethylene.	May be singed or desized by usual methods.	May be scoured with mild alkalis and detergents in jigs or becks at 160 to 180° F. Avoid caustic soda, heavy nips, high tension.	Use low-caustic or silica-free peroxide formulas in one-stage continuous systems. Open kiers, jigs, becks satisfactory with low-alkali peroxide fomulas. Chlorine, chlorite, and peracetic-acid bleaches satisfactory under controlled conditions.	May saponify film. Make trial runs.
Polyester + Metal Foil + Polyester	Yarn will stretch 100 to 120%. Acetone, benzene, chloroform, trichlorethylene delaminate. Gold yarns may lose color.	May be singed or desized by usual methods	May be scoured with mild alkalis and detergents on jigs or becks at 160 to 180° a. Avoid caustic soda, heavy nips, excess tension.	Modified two-stage caustic-steam and peroxide-steam system workable; also single-stage methods. Jigs, becks, open kiers can be used with peroxide formulas. Chlorine, chlorite, and peracetic-acid bleaches satisfactory under controlled conditions.	Satisfactory under 30 to 40 secs. exposure to caustic. Wash thoroughly.
Polyester + Metallized Polyester + Polyester	Yarn will stretch 100 to 120%. Acetone, chloroform, trichlorethylene may delaminate.	May be singed or desized by usual methods.	May be scoured with mild alkalis and detergents on jigs or becks at 160 to 180° F. Avoid caustic soda, heavy nips, excess tension.	Avoid caustic soda in peroxide formulas; do not use two-stage process. Jigs, becks, open kiers satisfactory. Chlorine, chlorite, and peracetic-acid bleaches are suitable under controlled conditions.	Not recommended; may etch metal
Polyester + Metallized Polyester	Yarn will stretch 100 to 120%. Acetone, benzene, chloroform trichlorethylene may delaminate.	May be singed or desized by usual methods.	May be scoured with mild alkalis and detergents on jigs or becks at 160 to 180° F. Avoid caustic soda, prolonged scouring, heavy nips.	Avoid caustic soda in peroxide formulas. Do not use two-stage process; jigs, becks, open kiers may be used. Chlorine, chlorite, and peracetic-acid bleaches satisfactory under controlled conditions.	Not recommended; may etch metal.

PROCESSING GUIDE (Gold and Silver Types)

Processing Steps			General Comments
Dyeing	Drying	Finishing	
Fabrics containing these metallic yarns may be pad-dyed. Avoid prolonged exposure to dye liquors, such as jig or beck processes. Select colors to avoid staining viscose film.	Usual drying machines and temperatures applicable. Avoid excess tension, overdrying, stoppages.	Light cold calendering, decatizing, shrinking are feasible. Fabric design may affect results. Usual plain or water-repellent finishes may be applied in pad, or resins not requiring afterwash.	This type of metallic yarn is best suited to loom-finished fabrics or fabrics requiring a minimum of wet processing. The yarns are generally resistant to dry cleaning.
Fabrics containing these yarns may be dyed with direct, developed, acid, chrome, vat, leuco-vat esters, naphthol, and sulfur colors or with selected disperse colors at 120° F. Optimum pH 6 to 8. Suggested temperature 160 to 180°F. Avoid prolonged boiling or excess acidity or alkalinity.	All drying methods are applicable. Moderate tensions and pressures are preferred. Avoid stoppages, overdrying.	All finishing steps normal to fabric are possible. Fabric design determines final effect in some cases. Usual plain, water-repellent, or resined finishes are suitable. Cold calendering satisfactory.	This metallic yarn withstands most wet-processing steps and dyeing procedures. In dyeing acetate fabrics, choose dyes applicable at 120° F. or film may stain. All processing involving boiling, acids, or strong alkalis should be watched carefully to avoid etching, saponification, blushing, or delamination. The yarn is fast to normal laundering and dry cleaning.
Fabrics containing these yarns are dyeable by same procedures used for the butyrate-acetate yarns. Avoid excess caustic, prolonged boiling.	All drying methods are applicable, to temperatures of 330° F. Moderate tensions and pressures are preferred. Avoid stoppages, overdrying.	All finishing steps normal to fabric are possible. Fabric design may limit shrinkage, other operations. Usual plain, water-repellent, or resin finishes suitable. Cold calendering satisfactory.	This metallic yarn behaves like Arnel as regards dyes. The yarn has low stretch and is more resistant to blushing in high wet heat than the butyrate-acetate type. Can be heated to 275° F. dry heat, higher for limited cycles. The yarn is fast to normal laundering and dry cleaning.
Direct, developed, acid, chrome, vat, leuco-vat esters, naphthol or sulfur dyes are applicable; disperse dyes at 120° F. Avoid excess alkalinity. This type of metallized yarn is generally more resistant to processing than any other.	Can be dried on usual machinery at up to 330° F. Avoid excess tension and pressures, stoppages, and overdrying.	All finishing steps normal to fabric are possible. Fabric design may limit shrinkage, other operations. Usual plain, water-repellent, or resin finishes suitable. Cold calendering satisfactory.	Tough, high-stretch film with excellent chemical resistance permits more latitude in processing. Film dyes like Dacron. The yarn is sensitive to pressure combined with dry heat over 300° F. Film will not saponify with caustic, but etching of metal can occur if exposed to alkalis or acids at elevated temperature for long periods. Fast to normal laundering and dry cleaning.
Most dyes suitable for polyester-film type are applicable. Care should be exercised in use of caustic, copper, mineral acids. This type etches more readily than foil-bearing types.	Can be dried on all usual machines at up to 330° F. Avoid excess tensions and pressures, overdrying, and stoppages.	All finishing steps normal to fabric are possible. Fabric design may limit shrinkage, other operations. Usual plain, water-repellent, or resin finishes suitable. Will stand embossing, Schreinering, cold calendering.	Tough-film yarn that may be processed generally under same conditions suitable for foil-bearing type above. Because of extremely thin metallic layer, yarn is more sensitive to strong acids, alkalis, and combined heat and pressure.
Dyes suitable for polyester-film types are applicable. Avoid excess caustic or mineral acids or prolonged boiling.	Usual drying methods are applicable to 330° F. Avoid excess tensions and pressures, overdrying, and stoppages.	All finishing steps normal to fabric are possible. Fabric design may limit shrinkage, other operations. Usual plain, water-repellent, and resin finishes suitable. Will stand hot or cold calendering, Schreinering.	This yarn is light and very soft. Chemical resistance is generally excellent, but metallic layer is very thin and more-easily etched than foil-bearing type. Avoid continued pressure and heat above 275° F. The yarn is fast to normal laundering and dry cleaning.

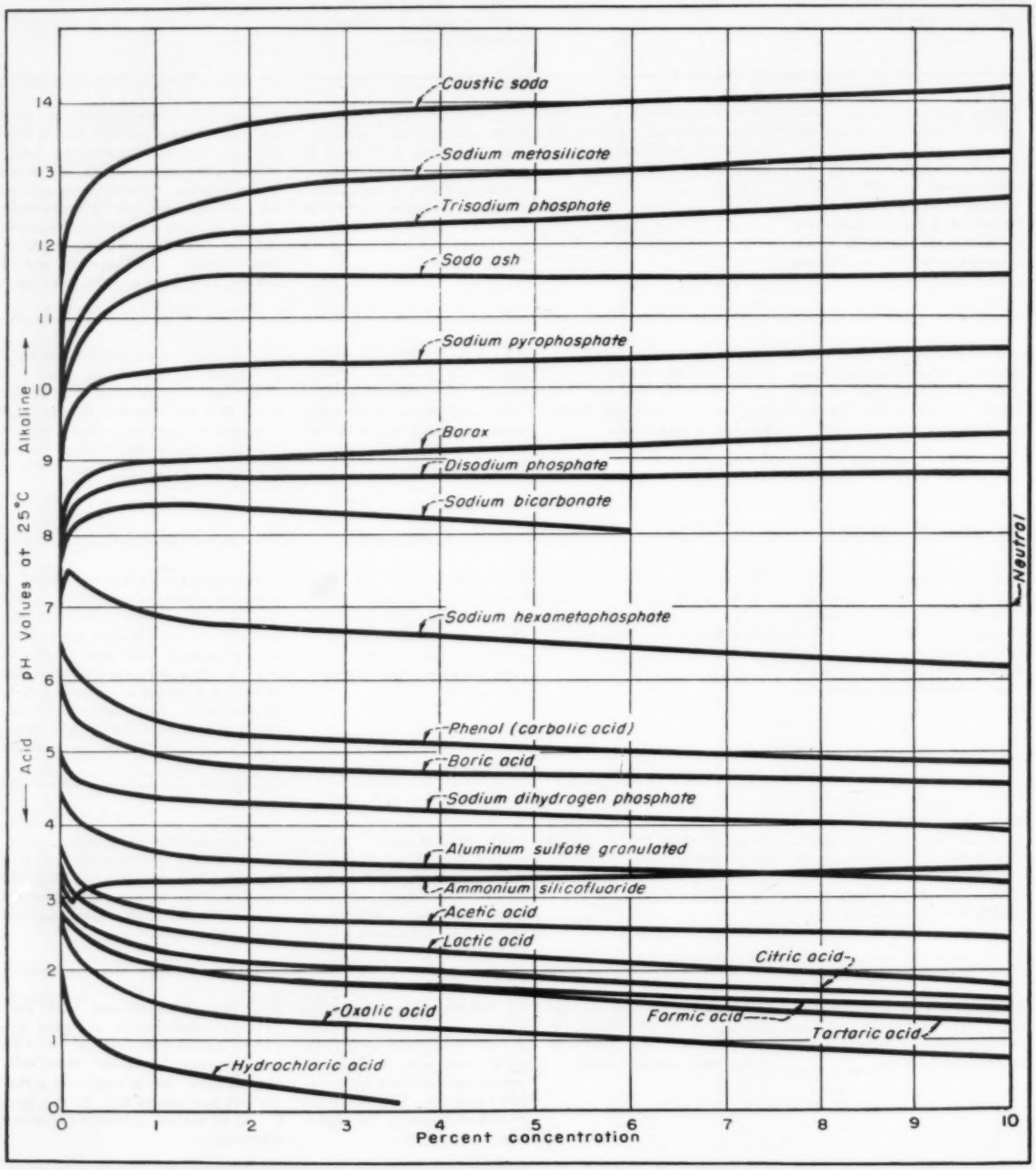
pH Curves of Common Acids, Bases, and Salts

This chart represents the combination of various pH determinations that have appeared in technical publications over a period of years.

It has proved quite useful in predicting the pH of chemical mixtures and the buffer action of the individual compounds.

The pH values were determined colorimetrically for all materials except caustic soda. Concentrations are given in percent except for sodium bicarbonate and disodium phosphate, which are in grams per 100 cc. of distilled water solution.

Much of the data represents work done at the Stamford laboratories of the American Cyanamid Co. and published in TEXTILE WORLD.



KLAUDER WELDON GILES MACHINE CO.

ADAMS AVENUE AND LEIPER STREET

FRANKFORD, PHILADELPHIA 24, PENNSYLVANIA

DYEING MACHINES

PRODUCTS

SKEIN YARN DYEING MACHINES: Various types for Scouring, Bleaching, and Dyeing Wool and Worsted yarns, and Slubbing, also Cotton, Silk, and Synthetic yarns.

YARN SCOURING MACHINES: Continuous or Apron type in All Stainless Steel construction.

RAW STOCK DYEING MACHINES: Various types for dyeing Raw Wool and Cotton, Waste and Rag Stock, also for Stripping and Bleaching.

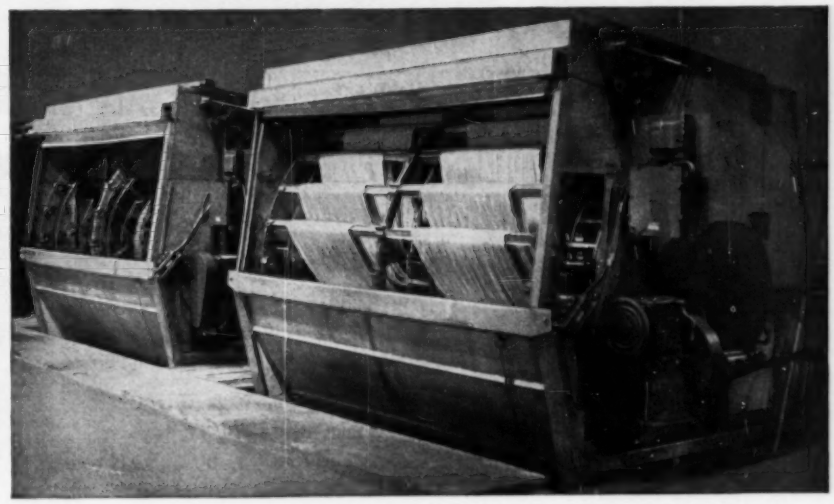
HOSIERY, GARMENT & HAT DYEING MACHINES: Rotary and Paddle Wheel Type.

MACHINE DYESTICKS: of Wood and Stainless Steel. The latter are more permanent—10 times the life of wood sticks and especially advantageous in the processing of Knitting Yarns, Boucle, Ratinet and Frill Yarns.

REPLACEMENT PARTS: for all Klauder Weldon Giles Machines.

DYE TUBS: Self Supporting Stainless Steel replacement or conversion of old kettles, also of wood either Lined or Unlined.

SPECIAL DYEHOUSE EQUIPMENT: In Stainless Steel construction.



2—500 lb. Capacity Stainless Steel Non-Hoist Type Skein Dyeing Machines.

ROTARY SKEIN DYEING MACHINES

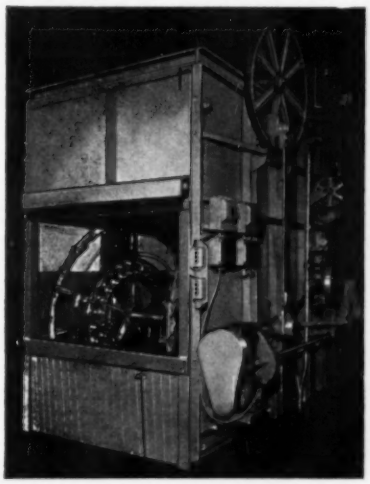
The well known and universally used Rotary Type Machines featuring All Stainless Steel construction is a specialty with us.

These machines are built in a wide range of sizes and two distinct types:

NON-HOIST MACHINES: for Wool, Worsted and Unmercerized Cotton yarn, and, **HOIST MACHINES:** for Silk, Rayon, Mercerized Cotton, and other yarns which are especially receptive to color. The hoist feature enables raising the reel with its load of yarn from the liquor for bath make up, sampling, and color or chemical additions.

The skeins to be dyed are suspended on a series of pairs of wood or metal dyesticks. The outer sticks are carried in suitable cups in the outer periphery of wheels forming the reel and the inner ones in suitable recesses in rings attached to the arms of the wheels about midway between the axle and periphery. Rings carrying the inside sticks are adjustable to provide proper angle of suspension and tension on all varieties of yarn or length of reeling and are also made, when desired, with several series of cups to handle a wider range of skein lengths. Retainers of the yarn carrying sticks provide for quick and easy loading and unloading of the machine.

The reel revolves half submerged in the dye bath and the dyeing is accomplished by gently passing the yarn through the bath. Each pair of sticks is given a quarter turn at each revolution of the reel to provide complete penetration and level dyeing of all portions of the skeins. For level dyeing and improved condition of the yarn after dyeing this principle has not been improved upon. It provides remarkable flexibility as regards variety of yarns and wide variation in yarn loads that may be dyed or processed in a machine of any rated capacity.



250 lb. Capacity Stainless Steel Hoist Type Skein Dyeing Machine.

NEW PADDLE WHEEL DYEING MACHINE . . . of all stainless steel construction is designed for the successful dyeing of a wide variety of products including tapes, sweaters, hosiery and other garments.

Write today for a newly printed bulletin describing this machine in detail.

STAINLESS STEEL PADDLE WHEEL MACHINE

is available with or without cover.

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The NATIONAL DRYING MACHINERY CO.

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NEW ENGLAND AGENT: Jones & Hunt, Inc.
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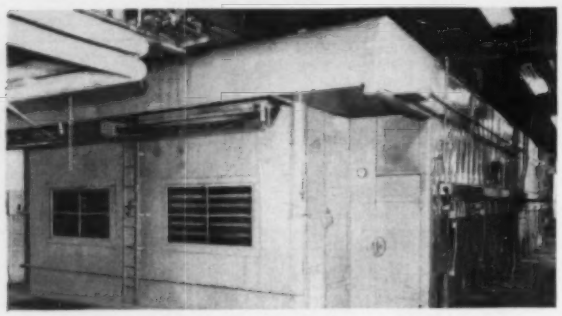
CABLE ADDRESS: "NADRYMA"
Western Union Code



"NATIONAL" MODEL G PIECE GOODS DRYER

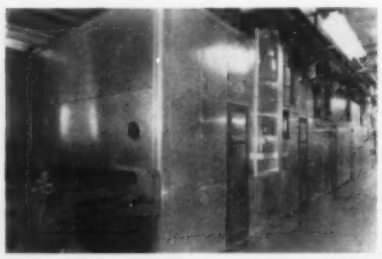
Designed to provide unequalled efficiency, speed and economy in piece goods drying and curing, and built for long, satisfactory service. Features include:

"INSUL-POLE" CONVEYOR. Patented rotating-expanding conveyor poles made of a special heat-resisting composition to provide greatly increased service life for the conveyor at higher temperatures. A new, simplified, yet more accurate loop-forming mechanism is now available.

NEW "P-4" CONSTRUCTION. This provides a precision-built, pre-fabricated, truss-type structure of greater strength, rigidity and durability. Dryer can be installed in half the time formerly required.

DUPLEX CONVEYORS . . . The new MODEL G Dryers can be furnished with two independently operated and controlled conveyors in the same drying system. This permits two runs, of light and heavy goods, at two different speeds.

GAS HEATING. Many new installations are equipped with the "National" Gas Heating System — the ultimate in safety and efficiency, and providing higher temperatures and greater drying speeds. Otherwise, heat source may be steam, electric or other medium.



"NATIONAL" SR-4 TENTER DRYER

Assures lower drying costs by providing greater drying capacity per lineal foot of frame, on all qualities. Designed especially for the high-speed frames now available. Features include:

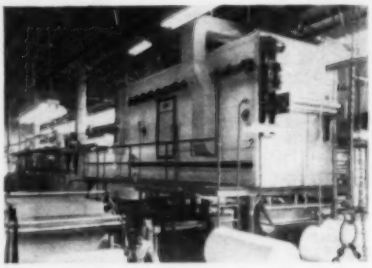
Individual air velocity and temperature control available for each 10′ section of frame.

Adjustable pitch fans and in-or out-of-line air blast nozzles, for maximum flexibility in application of the drying medium to all qualities and treatments.

Continuous filter screen that removes all lint from the circulating air and maintains maximum productive capacity at all times.

"NATIONAL" PRINT GOODS DRYER

Design, construction and control stress the importance of predrying through the use of high velocity nozzle impingement section and of avoiding "scrimps" in the printed material as it comes from the press.



"NATIONAL" ROLL DRYER

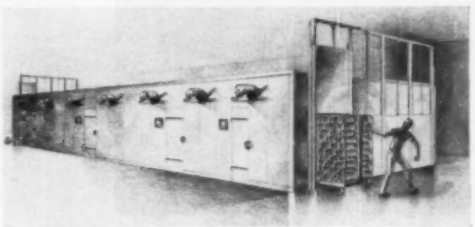
Designed to greatly increase capacity of existing drying equipment, with minimum additional floor space. Acts as pre-dryer, to take off substantial amount of initial moisture. Provides tensionless drying of open material. Gas or steam heated, in any required size or capacity. Can also be arranged to serve as highly efficient Roll Curer.

"NATIONAL" AUTOMATIC SKEIN DRYER

In this modern, three-zone machine, the time required for the drying—cooling—conditioning of yarn in the skein is greatly reduced, with resultant savings in labor and steam costs, and with increased uniformity in the processed product.

"NATIONAL" NYLON HEAT SETTING UNIT

Designed for continuous feed; a wide range of variable speeds; and operating temperatures up to or exceeding 500°F. Features include continuous automatic air cooling system; controlled reproducible tension; improved burner operation and control.



"NATIONAL" RAYON CAKE DRYER

Batch or continuous tunnel type design, with standard unit construction permitting future expansion. Features involving improved air diffusion and control assure higher drying speeds, closer uniformity and consistently better drying quality.

"NATIONAL" builds drying and conditioning equipment of every type required by the Textile Industry. Consult our Engineering Department concerning new installations or the adaption of "NATIONAL" features to existing machines.

EXCLUSIVE FEATURES OF REMAZOL® FIBER REACTIVE DYES

only REMAZOL dyes, supplemented by new Hoechst Naphtol specialties for darker shades, place at the stylist's disposal a complete range of dischargeable ground shades of excellent fastness to washing. Brilliant blues, greens, and pastels can thus be complemented by olive, khaki, slate blue and charcoal shades.

only REMAZOL dyes are well dischargeable to a good white and are suitable for vat colored discharges. Millions of yards have been processed at high speeds, replacing D and D colors and aftertreated direct dyes, in many shades fast to light, fast to chlorine, and fast to Wash Test #4.

only REMAZOL dyes form with cellulose an irreversible ether linkage through a reactive vinylsulfon group.

only REMAZOLS can be dyed continuously by the pad steam method at 90 yards a minute and are washed clean at that speed in open width scouring ranges.

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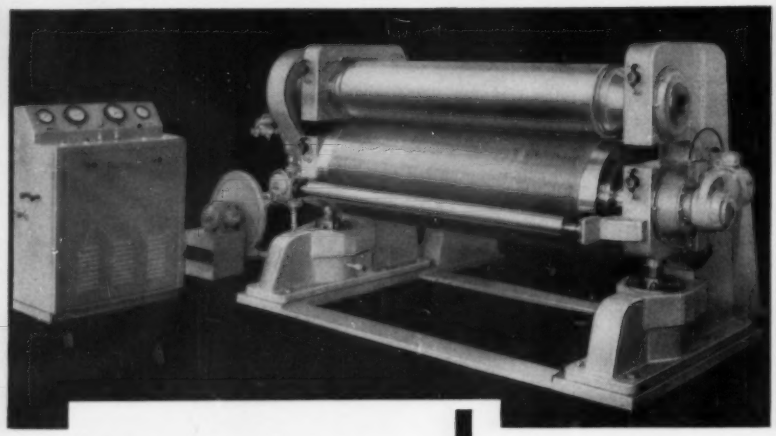
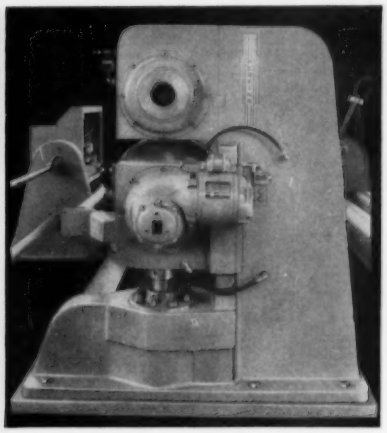
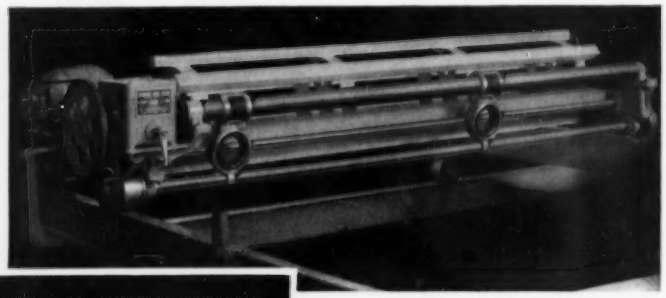




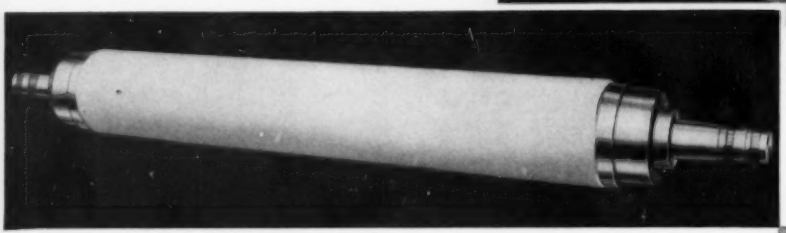
WORLD-WIDE ACCEPTANCE

Perkins Calenders, individually designed and custom-made, have long been known for their high factor of safety, simplicity of design and long record of service.

The 2-Roll 60-Ton Hydraulic Schreiner Calender is equipped with self aligning bearings and the Perkins patented bottom roll drive to keep both rolls rotating when skipping seams. The hydraulic unit enables individual pressure control of each side of the calender.

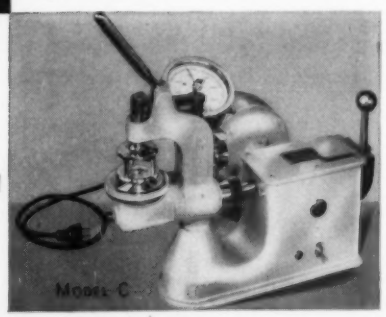


Perkins Bin Pilers are supplied with one, two, three or four traveling pot-eyes, and in widths up to 120". A real labor-saving unit — over 1,000 installed and operating.



PERKINS MULLEN TESTER

Mullen Testers are absolutely accurate, uniform and positive for ascertaining exact bursting strength of textiles.



When you specify Perkins Rolls, you enlist in your service more than the product of good equipment. You receive a plus factor — the outstanding ability of men whose skill and ingenuity has made Perkins the world leader in the roll industry.

Calender Rolls • Schreiner, Chasing, Rolling, Silk Finishing, and Embossing Calenders • Seam and Slub Detectors • Cloth Pilers • Automatic Winders • Hydraulic Power Units • Mullen Testers.

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THREAD CONES • YARNS • FABRICS • SUITINGS
WADDINGS • BLANKETS • BEDDING • CARPETING

Whatever your products, you can package for sales advantages with

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Overall decorated roll wrap

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- Simplify inventory control
- Eliminate "look-alike" competition
- Provide low cost "traveling" advertising

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Functional Papers
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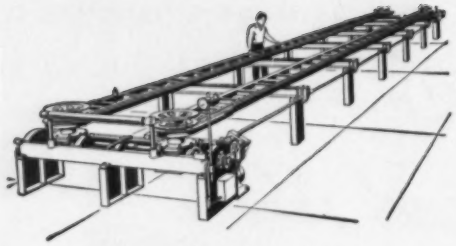
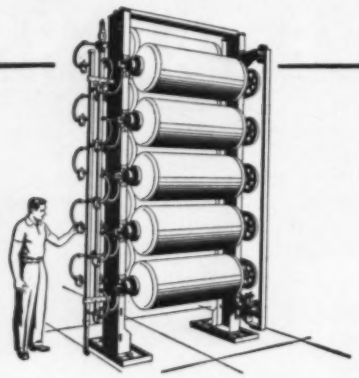
BUTTERWORTH
WET FINISHING MACHINERY



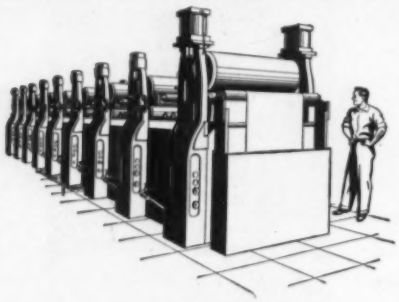
TENTERS AND CHAINS

Complete line of tenters, including Straight Automatic, Vibratory, Mercerizing, Return. For use on wide range of fabrics. Ripple-Flo design for resin finishes, water repellents and permanent finishes. New "Double O" Chain is the most popular in the industry. Chain body is 25% stronger without sacrificing interchangeability. Reduces downtime by giving longer wear.



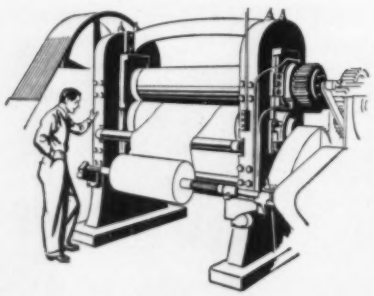
CYLINDER DRYING MACHINES

Engineered installations at a competitive price because of new manufacturing techniques, new fabricating economies. Coded or uncoded cylinders. Choice of copper or stainless steel cylinders . . . vertical or horizontal arrangement . . . fabricated or cast-iron columns . . . gear, sprocket and chain or V-belt drive.



COMPARTMENT WASHERS

Unit-type construction. Can be furnished in any number of compartments, for range operation or independent use. Different weights of cloth can be run without "scrimping in" or damaging the cloth. Individual motor drive for each set of squeeze rolls.



CALENDERS AND PRESSED ROLLS

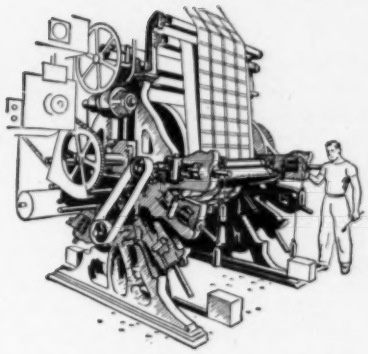
All types and sizes of calenders, from light two-roll machines with lever pressure or micro-set, to nine-roll hydraulic machines. Butterworth furnishes new Dura-Smooth Calender Rolls, or refills your present rolls regardless of make. Butterworth Rolls are available for every make of calender. Made of finest material, and tested for smoothness, hardness and density.

H. W. BUTTERWORTH & SONS CO.

BETHAYRES, PENNSYLVANIA

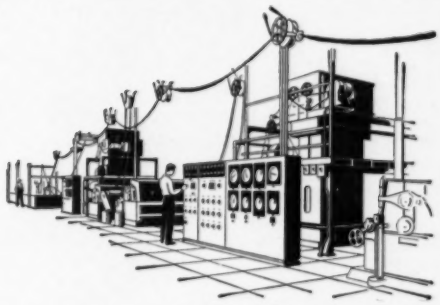
In the North: United States Supply Co., Inc., E. Providence, R. I.
In the South: Industrial Heat Engineering Co., Greenville, S. C.

The only manufacturers of a complete line of wet finishing equipment, including machines for bleaching, boiling-out, dyeing, mercerizing, finishing, embossing. Also pot spinning machines for synthetic fibers, drying cylinders, tenter chains.



PRINTING MACHINES

Designed and precision-built to permit close control of printing on cotton, silk or synthetic fabrics. Up to 14 color shades in multiple patterns and small figure designs are registered accurately by means of precision-machined nips.



COMPLETE RANGES

Butterworth builds complete ranges for continuous bleaching, continuous dyeing, mercerizing and finishing, including equipment for narrow fabrics, and laboratory ranges. At Butterworth, you get a complete operating job, including motors, instruments and auxiliary equipment. There is one contract, one responsibility for a complete installation.

REPAIRS AND REPLACEMENT PARTS

A $2-million inventory of 50,000 different Butterworth parts is available for immediate shipment. Butterworth service is offered to help your wet finishing department keep equipment at peak efficiency. Perhaps all you need is a spare part — but if you need it in a hurry, you'll get it in a hurry, if humanly possible.

SPECIAL MACHINES, EQUIPMENT AND PROCESS MACHINES

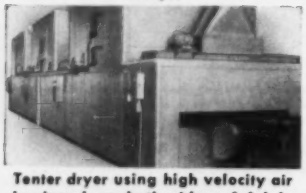
Many leaders in American industry have utilized the engineering skill and manufacturing facilities of Butterworth to carry out special projects requiring unique design, research and production machinery. Developmental work is strictly confidential.

Lanly TEXTILE Dryers & Ovens

PLAY A MAJOR PART IN THE HEAT PROCESSING OPERATIONS of the TEXTILE INDUSTRY

STEAM • GAS • OIL and ELECTRIC HEATING

Convection Heated Predryer



Tenter dryer using high velocity air impinged on both sides of fabric to give uniform and rapid drying

Oven for curing impregnated fabrics

Conveyorized Carpet Dryer

OVENS for

- Bleaching
- Dyeing
- Curing
- Coating
- Carbonizing
- Heat or Twist Setting
- Migration Control
- Glass Fibers
- Non-Woven Processing

Dryer Types

- Loop
- Multiple Pass
- Roller (Hot Flue)
- Tower
- Conveyor
- Tenter
- Batch

Get a LANLY Proposal

Upon receipt of information covering your needs, Lanly will submit recommendations and a proposal covering an oven or dryer that will be thoroughly guaranteed as to construction and performance.

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TEXTILE OVENS

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CHEMICALS FOR DYEING AND FINISHING

Tennessee Corporation, a basic producer of Sulfur Chemicals from mine to finished product, is located in the center of the great Southeastern textile industry and can supply your chemical needs in a minimum of time.

TC HYDRO SODIUM HYDROSULFITE

A dry, white, free-flowing crystalline powder of uniform size and structure. It is dust free, assuring higher stability and uniformity.

LIQUID SULFUR DIOXIDE

A product of highest purity—a superior reducing and bleaching agent. Removes residual chlorine and other materials which cause color reversion.

SUL-FON-ATES

Anionic surface active agents of exceptional quality—Custom sulfonations and preparation of special Sul-Fon-Ate salts.

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The Southeast's leading producer and supplier of Sulfuric Acid. All commercial grades and strengths of Sulfuric Acid from 60° Baume through the various oleums.

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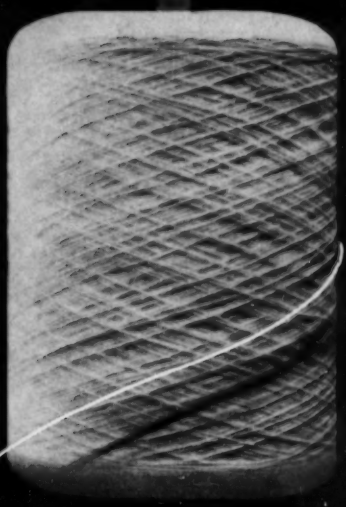
THAT SIMPLIFY COLORING OF SYNTHETICS

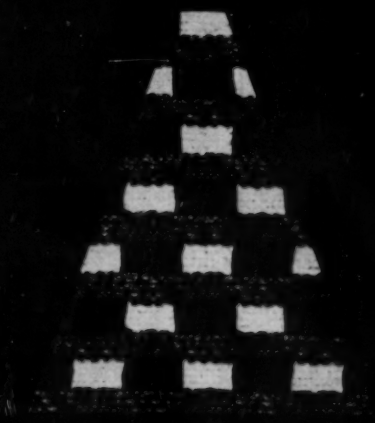


Cationic dyes for acrylics.

Genacryl dyes are modified basic dyes characterized by exceptional brightness, good to very good light fastness in full shades and very good washing fastness. They produce especially bright and fast colors on Orlon* and Acrilan† at low cost.

Disperse dyes for all synthetic fibers.

Celliton dyes are the most versatile and practical for fast shades on acetate, triacetate, and polyester fibers. On acrylic fibers, they produce light shades of excellent wash and light fastness. On nylon, they produce clear, level, fast shades, free of barré.



From Research to Reality

Disperse dyes for polyester fibers.

Genacron dyes are a specially standardized range of dispersed dyes for application on polyester fibers. They produce heavy shades which are fast to light, sublimation and washing. They have minimum staining effect on wool or cotton and are non-tarring.

Premetalized acid dyes for acrylics and blends with wool.

Supralan dyes build up well into full, level, fast shades at low cost on nylon and acrylics and blends with wool. Neutral dyeing, Supralan dyes minimize fiber damage and shorten processing time.

GDC continues to keep pace with the expanding synthetic fiber industry by developing modern dyes and application techniques. Call on GDC for assistance with any dyeing problems.

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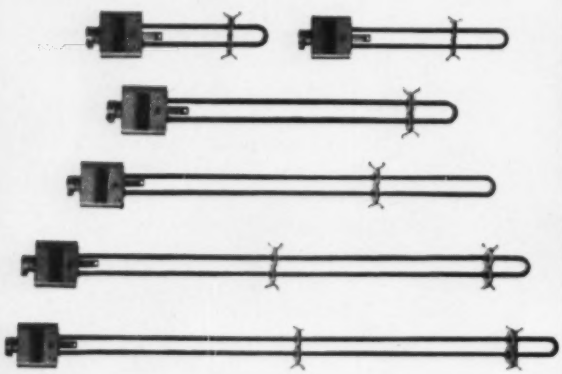
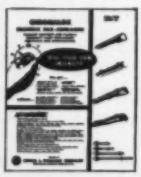
see the difference...
save the difference with
CHROMALOX
Adjustable Far-Infrared Heaters

This Chromalox URAD heater lets you match your heat source to your work area. In one basic housing you can install up to 27 different heated lengths; each can be varied with the area of the work.



You can do-it-yourself too. Chromalox Far-Infrared elements are designed with a sliding fit that lets you interchange elements anywhere along the housing length. No more wasted heat when you go from one work size to another. This versatility means real dollars and cents saving.

Chromalox Electric Far-Infrared radiation can be simply and precisely controlled over largest work areas, and is absorbed uniformly by practically all colors—even optically transparent materials.



FREE—Get more information about Chromalox Electric Far-Infrared Heat. Ask your Chromalox Representative, or write today for your copy of new Catalog G 1004.

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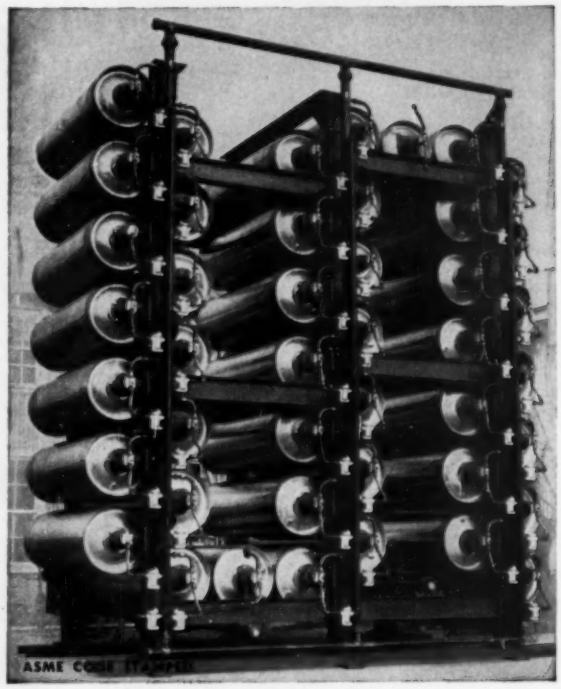
In actual day to day operation where the real worth of machinery is tested, Sims new Stainless Steel 75 psi reversed dished head 44 Dry Cans* are proven superior. They require less horse power . . . are easier on bearings . . . and save floor space with no loss in drying surface. And, the chain drive is on one side of the can, while the steam fittings are on the other side . . . permitting maintenance of the drive without time lost waiting for steam pipes to cool.
Furnished Teflon-coated if desired.



Fabricated and installed at Lanett Bleachery and Dye Works, Lanett, Alabama by Sims Metal Works.

FOR ECONOMY AND QUALITY
Our modern and progressive metal-working shops, our skilled craftsmen, our know-how—these are guarantees of quality. For custom tailoring of stainless steel, call, wire, or write *now*.

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Fabricators Since 1928
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Acid dyes for Polyamid Fibers

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Dispersed Dyes,
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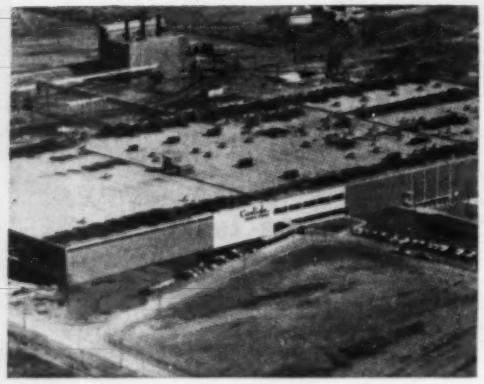
BRANCHES: HAVERFORD, PENNSYLVANIA • PROVIDENCE, RHODE ISLAND • ROCK HILL, SOUTH CAROLINA

plus the well-known specialty products of

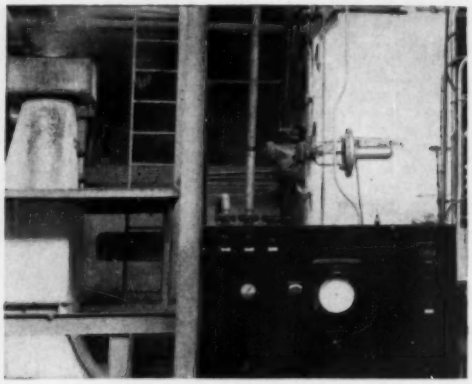
BAYER LEVERKUSEN · CASSELLA MAINKUR

Here's why leading mills Du Pont Solo-Matic



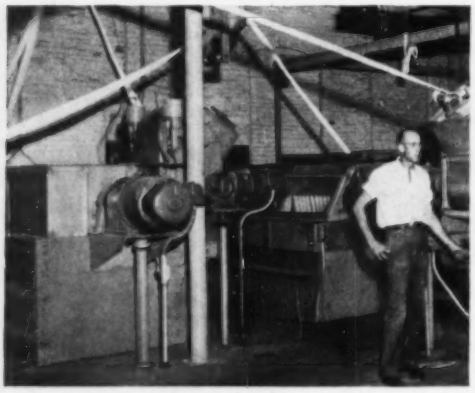
"We wanted the most advanced bleaching process—one simple to operate and capable of top-quality bleaching. Yet capital investment and operating costs had to be low. That's why we chose Du Pont's Solo-Matic Process."

Cone Mills, Carlisle, South Carolina



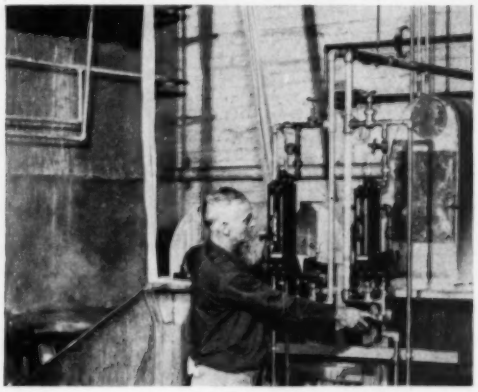
"We changed over from 4-step caustic-chlorine batch bleaching to the Solo-Matic Process . . . saved floor space and cut processing time. Bleaching quality improved—and with it uniformity in dyeing and finishing."

Old Fort Finishing Co., Old Fort, North Carolina



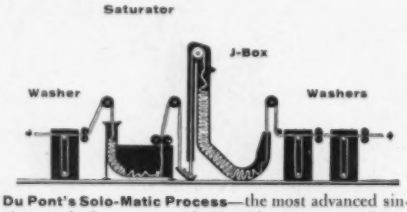
"We replaced our outdated caustic-chlorine batch process with the Solo-Matic Process . . . increased production 20%, cut bleaching costs by the same amount—all with substantial increase in bleaching quality."

Werthan Bag Corp., Nashville, Tennessee



"Located in a busy Chicago industrial area, we were faced with a serious lack of space. A Du Pont Representative showed us how the Solo-Matic Process could help. It has cut time and production costs 27% for us—saved 75% in floor space."

Joanna Western Mills, Chicago, Illinois



Du Pont's Solo-Matic Process—the most advanced single-stage hydrogen peroxide bleaching process available.

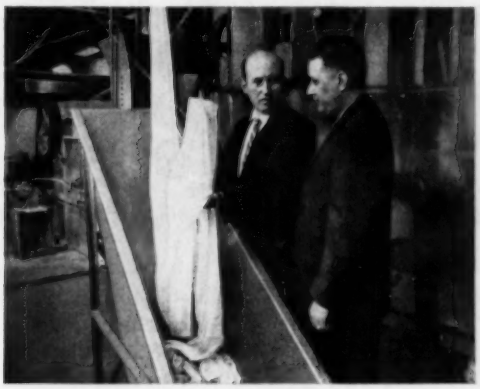
Don't confuse the Solo-Matic with any other process!

Other processes may *sound* similar, but there is *only one* Solo-Matic Bleaching Process, and it was developed by Du Pont. It is essentially a chemical technique that can easily be adapted to any existing or new continuous peroxide bleaching installation. The Du Pont Solo-Matic Process is helping more than twenty-five well-known mills improve bleaching quality, cut costs.

are sold on the exclusive Bleaching Process...

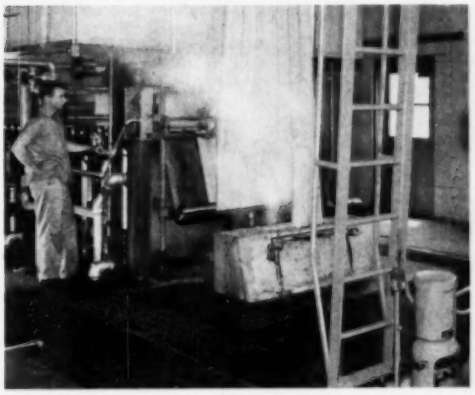
"Technical service from Du Pont helped us convert to the Solo-Matic Process using existing equipment. We've increased production 100%... cut labor costs 40% and didn't lose any production during changeover."

Dale Brook Finishing Co., Inc., Hohokus, New Jersey



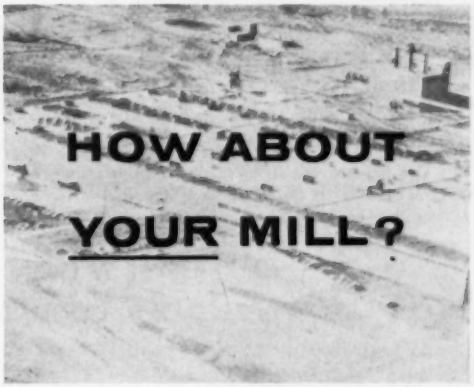
"Our production doubled, and bleaching costs decreased by 25% with the Solo-Matic Process. There's been no increase in labor or utilities—no additional investment in capital equipment. Quality has been maintained."

Harodite Finishing Co., N. Dighton, Mass.



"A Du Pont Technical Representative showed us how the Solo-Matic Process could do the job of a 2-stage installation, and do it at lower bleaching cost. We're glad we followed his advice—it saved us about $150,000 in capital investment."

Prominent Midwestern Mill



Would you like to *double* production using your present floor space . . . or maintain the same production in *half* that space in your plant? The Solo-Matic Process makes it possible . . . and can improve brightness, fullness and uniformity of your product at the same time.

You, too, can profit with the Solo-Matic or one of Du Pont's other bleaching processes. But whether or not you use any one of these, you can count on the advice and help of Du Pont Technical Representatives. They'll work with you on bleaching problems . . . help you trim costs, improve quality. If you wish, they'll conduct a confidential bleachery survey of your entire mill that can show you where and how to save money. No obligation, of course.

Whatever bleaching process you use, you can depend on Du Pont "Albone" hydrogen peroxide for uniformity and high bleaching efficiency. "Albone" has been used by leading bleacheries for many years . . . is available from convenient shipping points. Du Pont bleaching processes, technical services and "Albone"—a hard-working "team" to keep your bleaching costs low. Take advantage of them!

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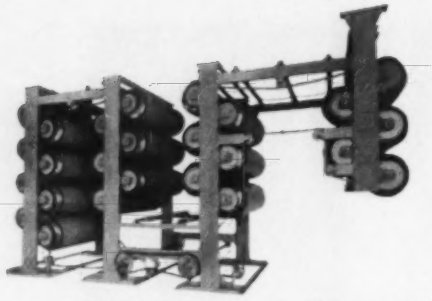
BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

ALBONE® hydrogen peroxide—for Solo-Matic and other modern bleaching processes

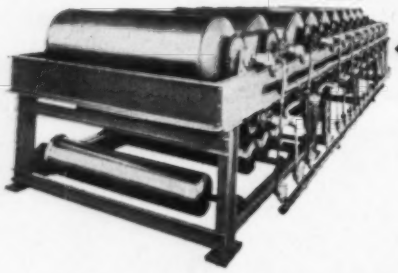
CARROLL
CLOTH FINISHING EQUIPMENT

STAINLESS STEEL CYLINDER DRYERS



Multiple Stock Vertical Dryer

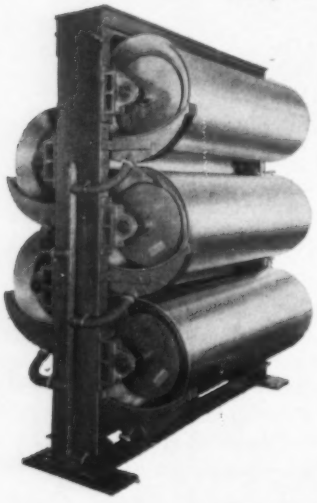
Drying Machines or individual cylinders made to your requirements in all diameters up to 12 foot and face lengths to 12 foot • Choice of drive; gear, sprocket or "V" belt • Choice of operating steam pressures, several types of cylinders to choose from.—Cylinders and structural frame work can be adapted to existing equipment • Light weight cylinders for higher pressures.



Horizontal Cylinder dryer also shows special application with cooling cylinders below.

Cylinder Dryers for various steam pressures

Our products are designed and built to comply with the requirements of the ASME Code and we are authorized to apply the appropriate Code symbols.



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Cooling Cylinder Machines — Vertical or Horizontal Arrangement.

• Individual Cylinders a variety of types and sizes.

• OUR PRODUCTS INCLUDE

Cylinder Dryers • Cooling Cylinders
Slasher Cylinders • Back Dryers
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Narrow Fabric Padders • Dye Tanks
Mixing Kettles • Carrier Rolls
Jacketed Cylinders • Compensators

J.E. CARROLL & Co.

Office and Plant located at 100-114 Cambridge Street, Lowell, Massachusetts

Finding a way to increase production and reduce waste can often result in substantial savings. Take fabric guiders, for instance . . .

MECHO AIR GUIDERS

Here are three ideas that can pay off for you for years to come with these ingenious cost-cutters.

ELIMINATE FABRIC SPOILAGE
Mecho's gentle action and exclusive features eliminate double edges, spattering and other damage to fabric.

SPEED UP FABRIC PROCESSING
by adjusting Mecho's selvage finger tension to handle the lightest fabric or #8 duck at 1 to 400 ypm *while in operation*. It'll stay accurate within 1/8 inch.

REDUCE REPAIRS AND DOWN-TIME
with the simplicity of Mecho's precision design . . . no weights or linkages . . . nothing to get out of order.

If you aren't already enjoying these and other cost-cutting advantages of Mecho Air Guiders, why not check up now?

Send today for your free copy of the Mecho Air Guider Catalog.

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Rohm & Haas Chemicals for the Textile Industry

LYKOPON concentrated sodium hydrosulfite powder for reducing vat dyes and for stripping in alkaline and neutral solutions.

FORMOPON sodium sulfoxylate formaldehyde powder or lumps for discharge and vat printing.

ACRYSOL water-soluble sizes for synthetic and natural fibers and thickeners for latices and resin dispersions.

RHONITE water-soluble thermosetting resins and reactants for crush resistance, stabilization against shrinkage and stretch, calendered effects, added weight and proper handle—all on a durable, wash-fast basis.

RHOPLEX aqueous, solvent-free dispersion of acrylic resins, for fabric backings, pigment bonding and non-woven fabric bonding. Hand modifier. Durable, abrasion-resistant, full and crisp, moderately firm, or soft and delustered.

RHOZYME concentrated enzyme products for efficient desizing under all conditions.

TAMOL dispersing agents for pigments and clays in dyeing, printing and backfilling operations.

TRITON synthetic organic surface-active agents for penetrating, wetting, emulsifying, softening, dispersing and scouring natural and synthetic raw stock yarn and piece goods.

FORMOPON EXTRA, PROTOLIN W and PROTOLIN SX zinc hydrosulfites and sulfoxylates for stripping all types of fibers.

Chemicals for Industry

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

LYKOPON, FORMOPON, ACRYSOL, RHONITE, RHOPLEX, RHOZYME, TAMOL, TRITON, *and* PROTOLIN *are trade-marks, Reg. U. S. Pat. Off. and in principal foreign countries.*

Save MATERIAL! Save TIME!

get MORE PRODUCTION

from your tenter frames . . .

GPE Controls

CLOTH GUIDE

Run tenter frames and other production machinery faster . . . and turn out better work. GPE Controls Cloth Guide lets you pin or clip more accurately, more surely . . . actually improves product quality while you cut production costs. Get the facts about this inexpensive way to modernize old equipment and insure top production from new equipment.

- for jobs of any size . . . smallest to largest
- most accurate tenter frame control
- completely non-contact . . . nothing touches the cloth
- ideal for all kinds of cloth, from the lightest scrims to the heaviest woolens.
- adaptable to any kind of machine
- air-sensing or photoelectric models . . . all with simple, low-cost hydraulic power
- the only cloth guide made by automatic control experts

Mail coupon for the FACTS

GPE Controls — A GENERAL PRECISION COMPANY

GPE Controls, Inc. (Subsidiary of General Precision Equipment Corp.)
274 East Ontario Street, Chicago 11, Illinois

Send me FACTS about GPE Controls cloth guides. I am interested in controlling .....(make of tenter frame) or a .....(other type of machine).

Name.....Title.....

Company.....

Address.....

City.....Zone.....State.....

Polymer PRODUCTS

YARN PREPARATION

Nylon Size (Polyacrilic Acid TS-20)†
Dacron Size (Polyfilm SD)
Loom Finish Size (Polyfilm L)
Fugitive Tints (Rinse Free Colors)
Softeners, Waxes, Lubricants, Plasticizers, Gelatines, Penetrants, Soluble Crayons

PRINTING-ROLLER and SCREEN

GUMS and THICKENERS
Water Soluble (Polygum 220, 221, 225, 230, 260)
Prepared Type (Polyprint SM 500)
EMULSION BASE THICKENERS FOR ALL DYESTUFFS

FINISHING

SOFTENERS
Cations (Polysoftener 200, 250, 800)
Anions (Polysoftener 75, 346 1525, 1610)
Nin-ionic (Polysoftener 100)
Sewing Lubricant A554

PLASTICIZERS

Polyflex 120, 910
Polylube P (Polyethylene Emulsion, Anionic)
Polylube EE (Polyethylene Emulsion, Non-ionic)

RESINS

Water Soluble (Polybond 20, 60, 90, BF)
Thermo Plastic (Polyvin Series)
Thermo Setting: Polyresin FS (Cyclic Urea Formaldehyde); Polyresin A850

WEIGHTERS

Polyweighter P
Polyweighter 6U

PIGMENT COLORS*

Imprint: Resinated Concentrates for Water System Printing
Impad: Concentrates for Pad Dyeing
Imperse: Non-ionic and Anionic Aqueous Dispersions

PIGMENT BINDERS

Binder Concentrate 1717
Low Crock Binder (1559, 1718)

ADHESIVES

Screen Table Adhesive W70
Screen Machine Adhesive SP

PENETRANTS, DETERGENTS, DEFOAMERS, THICKENERS, WETTING, AND REWETTING AGENTS, SYNTHETIC DYING ASSISTANTS

†Sole agents to textile industry for B. F. Goodrich Chemical Co., mfrs.

*Sole agents to textile industry for Imperial Paper & Color Co., mfrs.

Polymer

POLYMER INDUSTRIES
Springdale, Conn.

POLYMER SOUTHERN
Greenville, South Carolina

CIRCLE 278 ON READER SERVICE CARD

When it comes to Basic Chemicals for TEXTILES

... come to General Chemical!

There are good basic reasons for making General Chemical your source of supply for basic chemicals. Large-scale production is one. Long experience is another. And there are many more—including consistent high quality and uniformity of product . . . top-notch technical service . . . a coast-to-coast network of plants and distribution points . . . plus efficient follow-through from order to delivery and beyond that to satisfactory performance. That's why—when it comes to basic chemicals—it's wise to come to General Chemical for all these products:

BLEACHING
Sodium Silicate
Tetrasodium Pyrophosphate
Oxalic Acid
Sodium Bisulfite, Anhydrous
Hydrochloric Acid (Muriatic)
Disodium Phosphate

CARBONIZING
Sulfuric Acid
Aluminum Chloride, Solution

DESIZING
Sulfuric Acid

RAYON MANUFACTURE
Sulfuric Acid
Sodium Sulfite
Sodium Bisulfite, Anhydrous

DETERGENT
Trisodium Phosphate
Tetrasodium Pyrophosphate
Sodium Tripolyphosphate
Sodium Silicate
Sodium Metasilicate

DYEING
Glauber's Salt, Anhydrous
Sodium Sulfate
Acetic Acid
Sulfuric Acid
Hydrochloric Acid
Aqua Ammonia
Oxalic Acid

SOURING
Sulfuric Acid
Hydrochloric Acid
Acetic Acid

OTHER USES
Sodium Thiosulfate
Nitre Cake
Aluminum Sulfate
Ammonium Alum
Potassium (Potash) Alum
Ammonium Sulfate
Mixed Acid
Chrome Alum
Lead Acetate
Ferric Sulfate
(Iron Copperas Nitrate)
Ferric Nitrate
(Iron True Nitrate)

Baker & Adamson® Laboratory Reagents

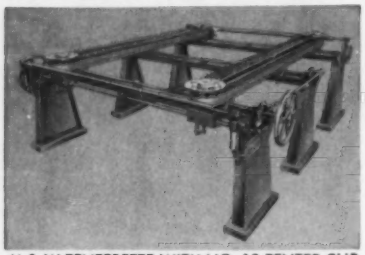
Basic to America's Progress

Allied Chemical

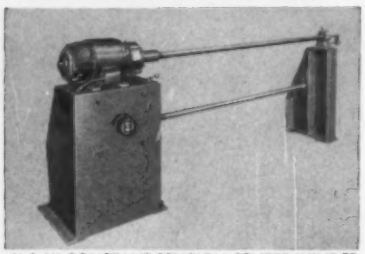
GENERAL CHEMICAL DIVISION
40 Rector Street, New York 6, N. Y.

CIRCLE 143 ON READER SERVICE CARD

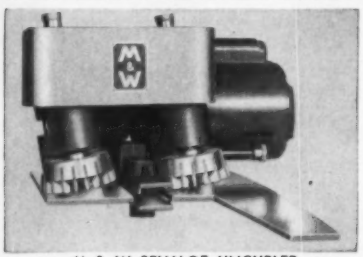
M & W HIGH SPEED TENTER FRAME



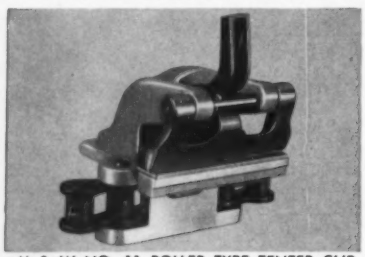
M & W TENTERETTE WITH NO. 12 TENTER CLIP



M & W CONSTANT TENSION CENTER WINDER



M & W SELVAGE UNCURLER



M & W NO. 11 ROLLER TYPE TENTER CLIP

MARSHALL and

Manufacturers of Quality

HIGH SPEED TENTER FRAMES Incorporate many new features for smoother operation, higher speeds and longer life. Available with heavy, medium or light duty, totally enclosed, drive units — also with wide parallel, narrow banjo and low profile rails with corresponding drive and idler sprockets. Economy in operation, low up-keep costs and elimination of all features that might cause damaged goods have been built into the design of all models. Speeds up to 250 y.p.m. are possible when frames are equipped with M. & W. Roller Type Tenter Chain.

MERCERIZING TENTERS Designed with heavy one-piece bed plate, heavy cast iron supporting members, totally enclosed overhead drive units and wide parallel rails. Can be equipped with M. & W. #6, #7 or #8 Style Mercerizer Clips. Very rugged construction throughout.

TENTERETTES & CLIP EXPANDERS Constructed for floor mounting, overhead suspension or movable on track. Built to any maximum width with either straight or hinged rails and in lengths from 30″ to 25′. Originated by M. & W. to answer special needs in finishing plants and laboratories. Use small M. & W. #12 Clips, either jaw or pin type.

PIN TENTERS Using either vertical or horizontal rails are designed for use principally with knitted fabrics or tufted carpet material. M. & W. #3, #3A, #10 and #15 Styles can be used and frames can be built to any required width and length.

BATCHERS & WINDERS Sturdy, trouble-free machines made in two sizes for any maximum cloth width. Increased rigidity for superior performance at high speeds. All working parts totally enclosed. Automatically wind at any desired tension or practically no tension at all, as controlled by adjusting knob. Both Standard and Heavy Duty M. & W. Batchers are fully equipped with expander and traveling carriage. New M. & W. Center Bar Winders for any width cloth are *not* so equipped, to eliminate cost of features you may not need — offer substantial savings in initial cost and installation and are internally wired so that only leads are needed for connection to power line. Winders can be made double for continuous operation.

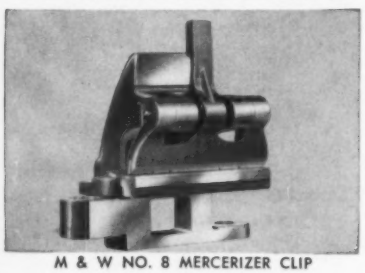
WEFT STRAIGHTENERS Electrically operated but manually adjusted and controlled. Three stationary rolls and two tilting rolls can be set to correct any ordinary skewed weft.

SWING PLAITERS Anti-friction bearings throughout. Designed for easy installation in any location in the plant.

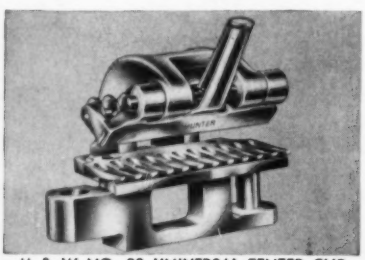
LET-OFF STANDS Movable, with casters — or with fixed base, swiveling to permit easy alignment of the cloth.

SELVAGE UNCURLERS Increase tentering speed 100% on any frame, vertical or horizontal. Automatically uncurl selvages, control feed to tenter chain — self-adjust instantly to ensure neater, more even selvage uncurling than could ever be done by hand. Wholly efficient on all weights, types and fibers of flat-knit fabrics. Simple installation and easy maintenance. Assure flat selvages, reduce waste, speed subsequent operations.

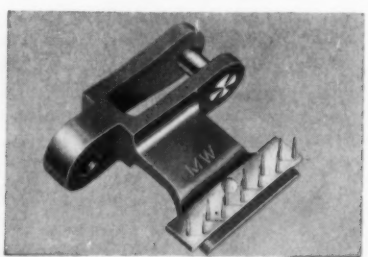
OVERFEED EQUIPMENT Of different designs to meet individual requirements. Usually applicable to pin tenters and pin frames but can be used on clip type frames when equipped with M. & W. #20 Universal Clip. Overfeeds are easily adjustable and very accurate with all types and weights of fabrics.



M & W NO. 8 MERCERIZER CLIP



M & W NO. 20 UNIVERSAL TENTER CLIP



M & W NO. 3 PIN CLIP

WILLIAMS CORPORATION

Textile Finishing Machinery • Since 1920

ROLLER TYPE TENTER CLIPS M. & W. #11 Clips have set Roller Clip standards since 1940. Engineeerd for every type of operation, equipment and fabric.Precise performance up to 250 y.p.m. Each clip in chain is connected to next by a standard roller chain link — drive sprockets and idlers touch only the roller links (not the body of the clips), thus ensuring quiet operation and long life at high speeds with minimum friction. Nearly a million now in use, giving perfect results. Originated by M. & W.

TWO PIECE TENTER CLIPS M. & W. Two Piece Clips are a new development, originated by M. & W. for exceptional savings on costly down time. A single socket head cap screw and lock washer rigidly hold the two sections together — accurate machining also locks the two parts together and prevents any movement between them. In case of damage or wear, top section is promptly removed and replaced, leaving bottom of chain in place on frame — and operation can be resumed immediately. No expensive rivets to knock out and replace. All parts easily accessible, removable parts interchangeable. If whole chain needs repair, this clip speeds up removal — reduces repair cost. All advantages of standard M. & W. Clips, plus unequalled new two-piece convenience and economy.

MERCERIZER CLIPS Come in several styles such as #6, #7, and #8. The M. & W. #8 Clip is now the most commonly used and offers certain advantages. It is specially designed with raised extra supporting lug at top to equalize the pull and prevent tipping of the chain.

UNIVERSAL TENTER CLIPS M. & W. #20 Clips do away with multiple tentering units, which in turn reduces floor space requirement with resultant savings. Operate as regular clips on any standard frame — accommodate overfeeding if frame is equipped with overfeed device. Same operating speeds as conventional clips. No pins needed. Changes from regular to overfeed while frame is operating — assures uniform and accurate overfeeding up to 20%. This clip (Dunglar System) is made and sold in the U.S. and Canada exclusively by M. & W.

COMBINATION CLIPS Dual-purpose clips for either regular or pin tentering. Available in several styles to fit existing tenter rail dimensions. Easily and automatically set from one type of tentering to another.

PIN CLIPS & PIN PLATES Clips are made in several styles for both horizontal and vertical rail tenters. Pin plates are built to customer's design and specifications.

REPAIR PARTS The M. & W. plants at Providence and Greenville render prompt repair service, maintaining for the purpose a complete inventory of Tenter and Mercerizer Frame parts of all makes.

Machinery: Gears, bearings, shafts, bushings, sprockets, idlers, openers, top casing, etc., are available for immediate delivery.

Tenter Chain & Components: M. & W. repairs all makes of Tenter Chain and at all times carries in stock such items as rivets, bushings, plates, jaw inserts, controllers, etc.

Pin Plates: M. & W. makes a specialty of the repinning of old Pin Plates and the manufacture of new Pin Plates to any specifications.

Plants and Representatives

PROVIDENCE, R. I. PLANT
46 Baker St. — Tel. Hopkins 1-3450

GREENVILLE, S. C. PLANT
South Pleasantburg Drive
P. O. Box 5285, Station B
Tel. CEdar 2-7338

West Coast Agents
E. G. PAULES & CO.
1762 West Vernon Ave.
Los Angeles, California
Tel. Axminster 3-6265

Canadian Agents
RUDEL MACHINERY COMPANY, LTD.
614 St. James Street, West
Montreal, Canada
Tel. Market 5346

HIGH SPEED TENTER FRAMES

MERCERIZING TENTERS

TENTERETTES & CLIP EXPANDERS

PIN TENTERS

BATCHERS & WINDERS

WEFT STRAIGHTENERS

SWING PLAITERS

LET-OFF STANDS

SELVAGE UNCURLERS

OVERFEED EQUIPMENT

ROLLER TYPE TENTER CLIPS

TWO PIECE TENTER CLIPS

MERCERIZER CLIPS

UNIVERSAL TENTER CLIPS

COMBINATION CLIPS

PIN CLIPS & PIN PLATES

REPAIR PARTS & SERVICE

Moretex the Rx of Chemicals

Like a doctor's prescription, Moretex Chemicals are held to rigid standards of purity. Laboratory research is constantly seeking ways in which to improve existing formulae and develop new ones for the fast growing array of fibers.

APPLICATION	PRODUCT NAME	CHEMICAL NATURE
ANTISLIP	MOROPOL EMULSIONS	EMULSIONS OF POLYETHYLENE
	BINDER X	CHITOSAN ACETATE
ANTICROCK	MOROPOL X-105	AQUEOUS POLYETHYLENE EMULSION
BLEACHING ASSISTANT	SULFONATED CASTOR OIL	50% AND 75% SULFONATED CASTOR OIL
CHELATING AGENT (Fe, Al)	MORENE S	POLYHYDROXY CARBOHYDRATE
CHELATING AGENT (General)	MORENE 30	SODIUM SALT OF ETHYLENE DIAMINE TETRA ACETIC ACID
EMULSIFIER	MOROSOL SL	POLYOXYETHYLENE SORBITAN STEARATE
DYE FIXATIVE	MOREPEL RW	AQUEOUS DISPERSION OF PARAFFIN & ALUMINUM ACETATE
FINISHES		
BODYING AGENT	MOROLUBE H61	ANIONIC FATTY ESTER EMULSION
CRUSH RESISTANT (Durable)	MOROPOL 700, 600	AQUEOUS POLYETHYLENE EMULSION
EMBOSSING & GLAZING	MOROPOL 700	AQUEOUS NONIONIC POLYETHYLENE EMULSION
SEWABILITY FINISH	MOROLUBE GW	AQUEOUS NONIONIC HYDROCARBON EMULSION
SHRINKAGE CONTROL	KYLAN	DEACETYLATED CHITIN
SOFTENERS		
CATIONIC	MORAMINE C	FATTY ACID AMIDE—ACETIC ACID SALT
KNITTING	MOROPOL 600	NONIONIC POLYETHYLENE EMULSION
NAPPING		
SOFT	MORAMINE NS	MIXED FATTY SULFONATES & AMIDES
FULL BODY	MOROFIN 61	ANIONIC DISPERSION OF FATTY ACID ESTERS
SCROOP	MOROFIN AD	ANIONIC DISPERSION OF FATTY ACID ESTERS
NON SOIL RETENTIVE (Durable)	MOROPOL 762	DISPERSION OF GLYCERIDIC EPOXYDIZED OIL
WASH & WEAR (Durable)	MOROPOL 700, 762	NONIONIC EMULSION OF DURABLE RESIN PLASTICIZERS
LUBRICANT (Yarn)	MOROLUBE BA	NONIONIC LIQUID EMULSION OF SATURATED HYDROCARBON
PENETRANTS		
DYEING	MOROWET DC70, DC25	SODIUM SALTS OF DIOCTYL SULFOSUCCINATE
MERCERIZING	MERCERIZER ASS'T.	CRESYLIC BASED PENETRANT
REWETTING	MOROWET LF	SULFONATED BUTYL OLEATE (Sodium Salt)
PLASTICIZER & DISPERSANT	MOROSOL 4L	PEG 400 MONOLAURATE
SIZING		
COTTON	MORETEX 70	MIXTURE OF WATER INSOLUBLE
SYNTHETICS	MORETEX 85	MIXTURE OF WATER DISPERSIBLE FATTY ACID AND FATTY GLYCERIDE DERIVATIVES
WATER REPELLENT	MOREPEL RW	AQUEOUS DISPERSION OF PARAFFIN AND ALUMINUM ACETATE

MORETEX *Chemical Products,* INC. **Spartanburg, S.C.**

ESTABLISHED 1908

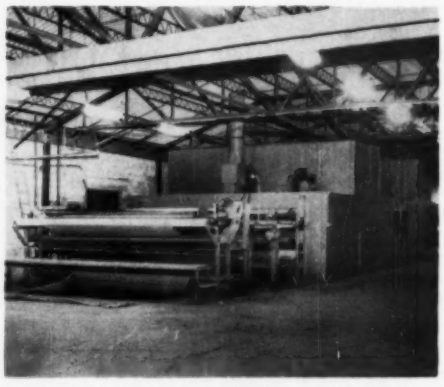
CIRCLE 279 ON READER SERVICE CARD

flexibility in a dryer . . .

DALTON ENDS YOUR CURING PROBLEMS

GAS-FIRED CURING OVEN WITH BUILT-IN TENTER

This unusually versatile operation is a 60 foot, 3 pass, gas fired, warm air curing oven. Carpeting is run on the tenter on the first and second passes. The third pass is on rolls. A conveyor belt is also installed on the first pass so that material may be run through the oven without the use of the tenter. This DALTON three-pass oven gives more curing time in the oven . . . resulting in *higher production* and *more thorough curing* of the latex compound.



ALL DALTON SYSTEMS are engineered to your individual needs with heavy duty construction throughout. A survey by our trained engineering staff with recommendations for improving your plant's efficiency will be made at no obligation. OVER 40 INSTALLATIONS IN THE TEXTILE INDUSTRY.

COMPLETE LINE OF DALTON EQUIPMENT & SERVICES INCLUDES STEAM, INFRA-RED & GAS DRYERS • ROLLA-COTA & AUTOMATIC SPRAY LATEX APPLICATORS • FOLDING & ROLL-UP MACHINES • CONVEYORS • BEATERS • EXHAUST & BLOWER SYSTEMS • SCRIM APPLICATORS • PEBBLE FOAM APPLICATORS • FOAM RUBBER APPLICATORS • SHEET METAL FABRICATION • HEATING & AIR CONDITIONING • STEAM WET-OUT BOXES • "J" BOXES • TENTER FRAMES • AUTOMATIC SELRIDGE TRIMMERS • AUTOMATIC SELRIDGE LIFTERS.

Manufacturers of equipment for the textile industry since 1936.

DALTON SHEET METAL COMPANY, INC.

C. F. HAWKINS, SR.

439 SOUTH MCCAMY STREET — TEL. BROADWAY 8-1656 — DALTON, GEORGIA

WHEN YOU SPECIFY SWIFT

YOU CAN BE SPECIFIC

SWIFT & COMPANY

Surfactants, Soaps and Synthetics for Textile Processing Uses

DETERGENTS	SPECIFICATIONS: GENERAL TYPE	% ACTIVE	FORM	USE: WETTING	EMULSIFICATION	DYE ASSISTS	FULLING	SCOURING
SOLAR 40%	Alkylaryl Sulfonate (anionic)	40%	Flakes & Granule	•				
SOLAR 90%	Alkylaryl Sulfonate (anionic)	90%	Flakes & Granule	•				
SOLAR NP	Oxyethylated Alkylphenol (nonionic)	100%	Liquid	•		•		
SOLAR 25	Alkylol Amines (modified) (combination nonionic, anionic)	100%	Liquid	•	•	•		
SOLAR REGULAR	Alkylol Amines (modified) (combination nonionic, anionic)	100%	Liquid		•		•	•
SOLAR TE	Alkylol Amines (modified) (combination nonionic, anionic)	85%	Liquid		•		•	•
SOAPS		**TITER**						
VERTEX (94% Soap)	Sodium Oleate	10°-12°c	Flakes					
T-25 (92% Soap)	Red Oil	25°-28°c	Flakes					
WOOL SOAP (92% Soap)	Tallow, Coconut Oil	38°-39°c	Flakes & Powder	•				•
557 SOAP	Soya, Coconut Oil	23°-25°c	Flakes	•		•		•
POTASSIUM SOAP	Hydrogenated Tallow	45°-47°c	Flakes	•		•		•
GOLD MEDAL (92% Soap)	Neutral Vegetable Oil	30°-33°c	Flakes & Powder	•		•		•

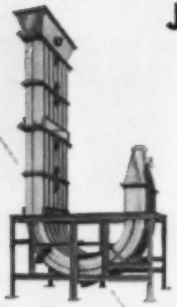
ONE SOURCE FOR:
Sure, skilled and experienced service wherever fine fabrics need the *right* treatment.

Swift
104TH YEAR
To Serve Your Industry Better

SWIFT & COMPANY
INDUSTRIAL SOAP DEPARTMENT

4115 Packers Avenue • Chicago 9, Illinois

J-BOXES



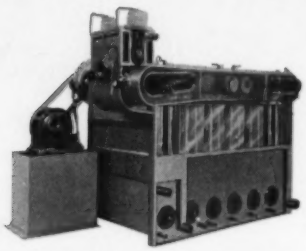
BECCO PROCESS

J-Box with steam manifolds in straight section of box. Open type plaiter.

DU PONT PROCESS

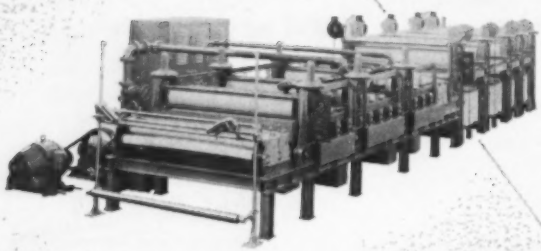
J-Box with new type heating chamber. Enclosed plaiter.

MULTI-STAGE WASHERS



Stainless steel, 3-4-5 and 6 stage rope washers. 50″ and 60″ widths. True counter flow of wash water. Adjustable tension. Fully enclosed.

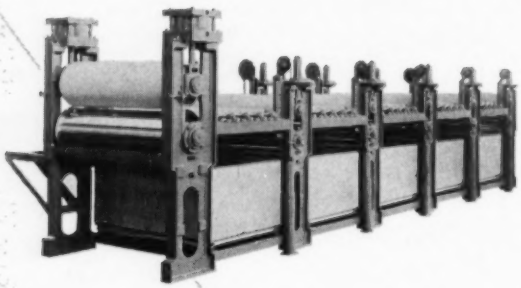
CHAINLESS MERCERIZERS



A versatile mercerizing range with open width washer for cottons as well as fabrics with warps and fillings of different fibers.

OPEN WIDTH WASHERS

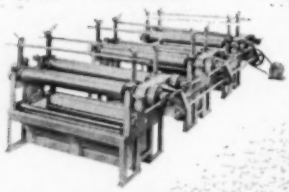
Unit construction. 5 and 10 ton squeezers. No pressure levers to obstruct operators. Adjustable heights for skying rolls. Tanks readily removed. Rack and pinion compensators. Machined cast iron frames. Accurate tracking of fabric.



SATURATORS

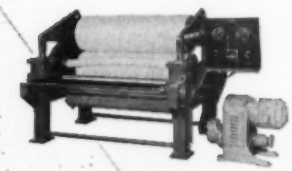
Stainless steel tank. Pneumatically loaded squeeze rolls. Rope and open types.

JIGS



Built for light or heavy weight fabrics. Fine adjustment of cloth tension. Smooth winding and tracking of 30″ diameter rolls from beam to beam.

PADS

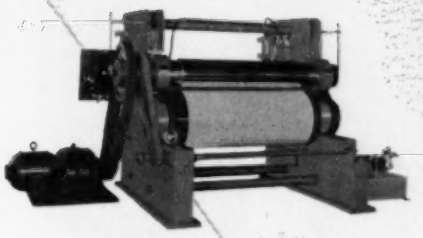


2 and 3 roll types. Pressures and face widths to customers' requirements.

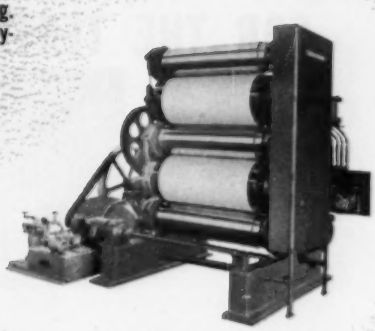
McKIERNAN-TERRY CORP.

SOUTHERN REPRESENTATIVE —

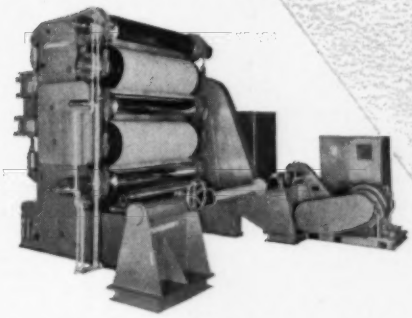
CALENDERS



2 Roll Open Frame Calenders — Quick conversions from Friction — Schreiner — Embossing — Rolling. Tapered bore roller bearings, hydraulically removed.



3-4-5 Roll Open Frame Calenders — Capacities as required. Built for Rolling, Chasing. Provisions for conversions from Friction and Schreiner services. Tapered bore roller bearings, hydraulically removed.

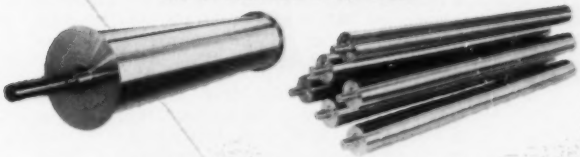


5 Roll, high speed, open face calender; centerless rewind; designed for special finishes of paper and textile fabrics: separate controls for pneumatic loading of upper and lower rolls; provision for various combinations of rolls in contact; controls for surface temperature of heated cylinders; tension control of web.

FILLED ROLLS

Friction, Schriener, Rolling, Chasing, Embossing — Made from selected pre-conditioned stock in all combinations of filler, under constant pressure and rigid controls. Shafts electronically inspected.

SPECIAL ROLLS



Special rolls in all constructions, including water cooled, steam and gas heated.

OTHER McKIERNAN-TERRY PRODUCTS

Continuous dyeing and bleaching ranges. Steamers and agers. Open width and rope saturators, squeezers. Drag reels, plaiters and auxiliary equipment. Gas burning equipment for calenders. Special machinery to customers' requirements.

TEXTILE MACHINERY DIVISION, DOVER, N. J.
ROLL DIVISION, HARRISON, N. J.

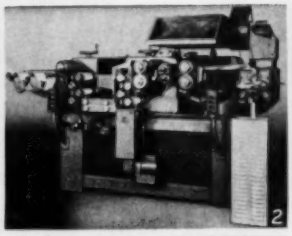
McK T

Industrial Equipment Company, 812 Johnston Building, Charlotte, N. C.

CIRCLE 149 ON READER SERVICE CARD

TURBO . . . SINCE 1929
DESIGNERS AND BUILDERS OF PRECISION MACHINES FOR THE TEXTILE INDUSTRY

1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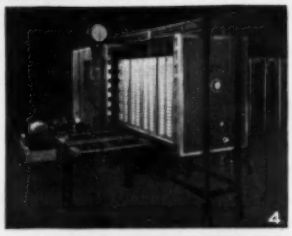
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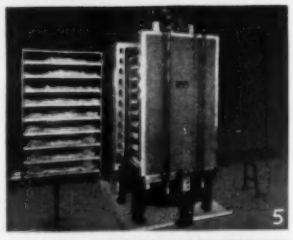
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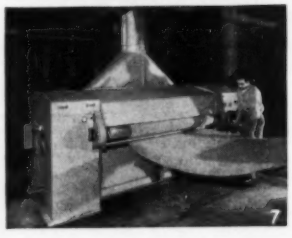

7

1. Turbo Smith-Drum Package Dyeing Machine. Complete line of Turbo Smith-Drum dyeing, extracting and drying equipment is described in folder available on request.

2. Turbo Stapler, the one-machine, modern way to tow processing. Converts fiber tow into controlled sliver and maintains the original parallelism of the tow. An extremely compact unit, push-button controlled. All elements — stretch zone, break and crimp zones are in one machine. Send for literature.

3. Model W Tow Crimper, used by major fiber producers to make the crimping of synthetic fibers a uniform, high-production operation. Crimp can be varied by adjusting a single knob. Folder available.

4. Turbo Fiber Setter — for setting tow or sliver in tow cans, illustrated; for setting carpet yarn in baskets; for setting modified filament sweaters on trays.

5. Turbo Sweater Setter. Modified filament sweaters are "set for life" in this tray-type machine. Production rate of 400 doz. sweaters per 8 hour day. Automatic operation. Send for folder.

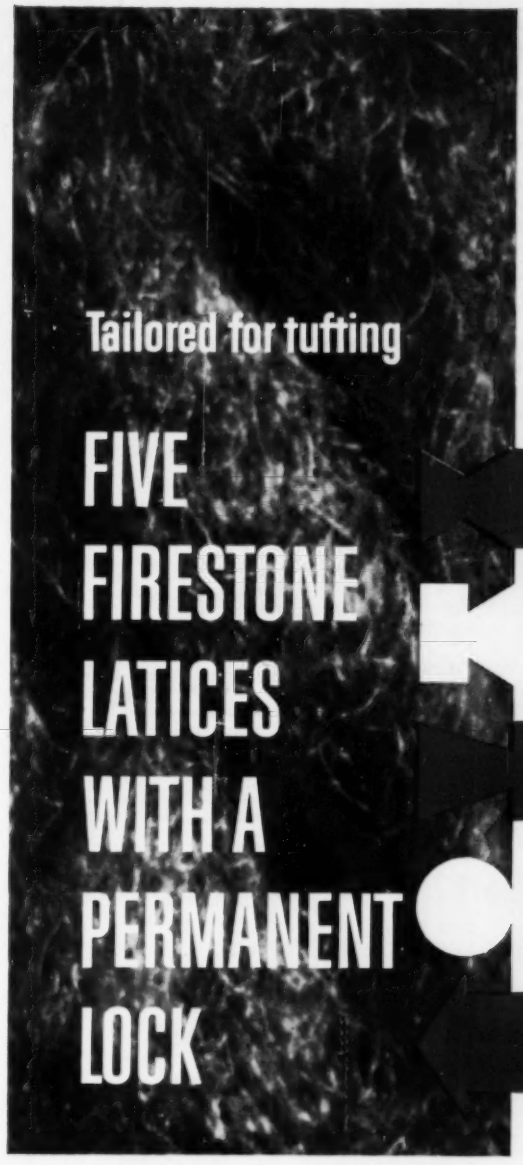
6. Turbo Dye Boarder offers complete hosiery dyeing and finishing in one machine. Production up to 140 doz. prs. in 8 hours. One operator. Part of the famous Turbo family of preboarders, finish boarders, combination machines and boardless dryers. Write for complete information.

7. Turbo Electro-Finisher changes the appearance and character of woolens, wool blends, and high pile fabrics. Fibers are separated, straightened and polished. Accurately controlled temperatures. Literature available.

TURBO

. . . a family of engineered machines

TURBO MACHINE COMPANY, LANSDALE, PA.



A Firestone FR-S latex for every carpet-backing requirement! These five product-specialized, stable-priced polymers are built to assure the production of stronger, longer-wearing, more attractive and saleable tufted carpeting for less cost. Individual tufts lock into place to stay—permanently welded to backing for new, long life. Rugs lie flatter, look better with shrinking, puckering or raveling at edges and seams gone for good. Get together with your Firestone Technical Service representative this week. Call today or write for details, FIRESTONE SYNTHETIC RUBBER AND LATEX COMPANY, Akron 1, Ohio.

FR-S Firestone

BETTER RUBBER FROM START TO FINISH

Copyright 1959, The Firestone Tire & Rubber Co., Akron, Ohio

HARSHAW

ORGANIC PIGMENTS

For cotton printing and dyeing

HARSHAW

DYESTUFFS

Aniline • Acetate
Alizarine

HARSHAW

USP and TECHNICAL

Tannic acid • Pyrogallic acid
Gallic acid

HARSHAW

UVERSOFT "D"

● UVERSOFT "D" is a cationic surface active agent which produces a full, soft hand with little, if any, reduction in moisture absorbency of the TREATED material. It can be exhausted from a long bath, and has an excellent retention in an aqueous system.

HARSHAW

ZINC NITRATE FLAKE

Harshaw Zinc Nitrate Flake is especially suited for polymerizing resins currently being used for wrinkle-free and wash-and-wear fabrics.

TYPICAL AVERAGE ANALYSIS

Assay as $Zn(NO_3)_2 \cdot 4H_2O$	72.5%
Zn	24.6%
Fe	0.001%
Pb	0.003%
pH of 5% solution	5.2
Insol. in 1% Nitric Acid Solution	0.001%

THE HARSHAW CHEMICAL COMPANY
1945 East 97th St. • Cleveland 6, Ohio

The original resin co-polymer that eliminates "Resin Decay" in all resins.

Poly Coupler®

Used in the Textile Finishing Field for many years to inhibit and control odor development, formaldehyde fume generation, or to reclaim resinated goods without stripping. Available in three chemical grades, specific for any type resin system.

MANUFACTURED BY

Textile Adjuncts Corporation

DISTRIBUTED NATIONALLY BY

CROWN CHEMICAL CORP. • 240 India Street, Providence, R. I.
OSCO CHEMICAL CO., INC. • 710 Tenth St. N. W., Atlanta, Ga.
CHEMICAL ASSOCIATES, INC. • 25 Gerard Dr., Waldwick, N. J.
SIDNEY SPRINGER • 816 Stanford Ave., Los Angeles, Calif.

ANOTHER TEXTILE ADJUNCTS PRODUCT

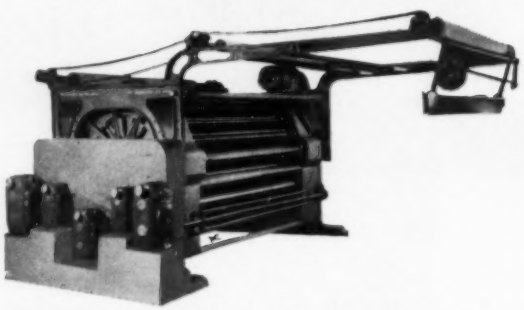
water·skipper®

The proven anti-resin deposit agent, that prevents resin build-up on finishing equipment. Reduces shut-downs for clean-ups by 50%.

Furnished in aerosol or bulk.

CIRCLE 280 ON READER SERVICE CARD

A Complete Line Of High Speed Napping Machines



36 ROLL High Speed Double-Action Napping Machine
30 ROLL High Speed Double-Action Napping Machine
24 ROLL High Speed Double-Action Napping Machine
20 ROLL Single or Double-Action Napping Machine

Special Machinery for Knitted Fabrics

Our Representatives are well qualified in the finishing of all types of fabrics.

WOONSOCKET NAPPING MACHINERY CO.

WOONSOCKET, RHODE ISLAND, U. S. A.

"Builders of the World's Best Napping Machines"

CIRCLE 281 ON READER SERVICE CARD

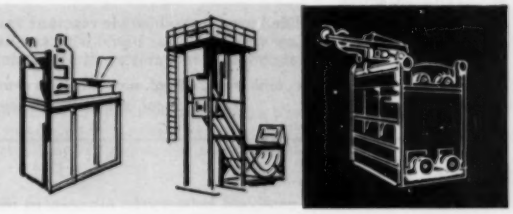
RODNEY HUNT TEXTILE WET-FINISHING MACHINERY

A LONG-TERM INVESTMENT IN SOUND ENGINEERING AND SKILLFUL STAINLESS STEEL FABRICATION

For more than a century, Rodney Hunt machines have helped the textile industry maintain high production and quality at a profit. Licensed under both Becco and duPont patents, Rodney Hunt Machine Co. maintains a continuing program of research and development in collaboration with these and other companies to give the textile industry the benefit of the most modern processes and equipment.

BLEACHING

Complete single or multi-stage Ranges, including Rangette® equipment for lower production needs. Slack Loop and Tensitrol® washers, Saturators (Rope or Open Width), J-Boxes (duPont and Becco designs), Tanks, and complete chemical feed systems, instrumentation, and drive.

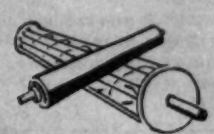


DYEING and FINISHING

Complete continuous dyeing and finishing Ranges for piece goods and carpets, including Wringmaster® and Niptrol® Padders and Extractors, Tensitrol® Steamers and Agers, Standard and Tensitrol® Open Width Washers, Tru-Shade® Dye Becks and Kettles for rope or open width, including Sample Machines, Tru-Shade® combination Washing and Dyeing Machines.

SPECIAL MACHINES

Non-Woven Saturators, Endless Felt Washers, Stainless Steel Fulling Mills, Yankee Clipper® Washers, Carbonizers, Wringmaster® Rotary Laminating Presses, Coaters, Whirlwind Sample Dryers, Special machines for specialized needs.



AUXILIARIES

Shaf-tite® Rolls and Reels—all types and designs, Let-off and Batching Equipment, Folders, Compensators, Stainless Steel Tanks, Pot-eyes, Roller Pot-eye Guides, Draw Reels and Doffers, Scutchers.

SEND FOR LITERATURE

Bulletin No. 54—
Niptrol® Mangle

Catalog No. 849—
Tensitrol® Washers

Catalog No. TM-89—
Textile Wet-Finishing Equipment

RODNEY HUNT MACHINE CO.

72 Mill Street, Orange, Mass., U. S. A. • Telephone Kingsdale 4-2511

SALES AGENTS:
Hayes Textiles, Inc., Spartanburg, South Carolina
W. J. Westaway Co., Ltd., Montreal, PQ, Canada

RODNEY HUNT®

CIRCLE 153 ON READER SERVICE CARD

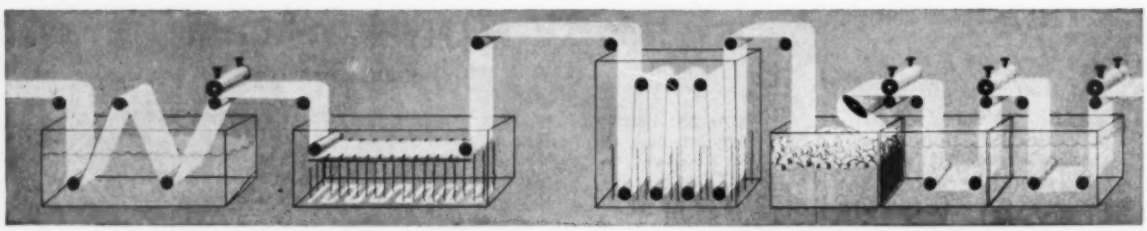
MONSANTO CHEMICAL COMPANY
PLASTICS DIVISION

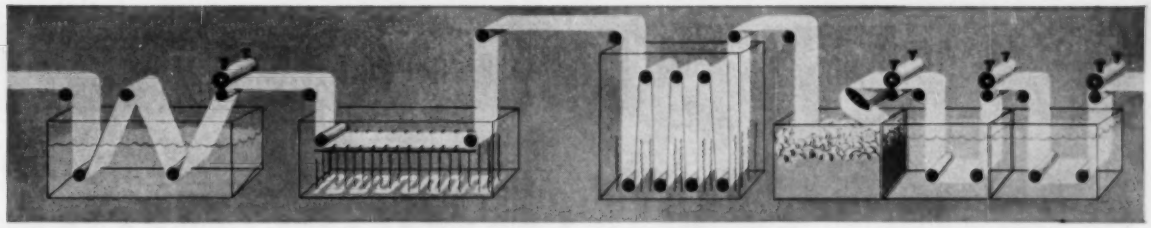
HEADQUARTERS FOR TEXTILE RESINS

FINISHING

	Description	*Application*
RESLOOM E-50	Modified urea formaldehyde reactant resin, 50% solids. Low viscosity, clear liquid with excellent stability; completely miscible in water at all proportions. *(Tank car, tank truck, 55-gal. nonreturnable drums, 5-gal. nonreturnable cans.)*	FOR COTTON AND VISCOSE: Dimensional stability and wrinkle recovery, with no stiffness or harshness. Excellent for texturing effects. Durable to laundering. Will not discolor when bleached with chlorine.
RESLOOM* E-63	Pre-catalyzed heterocyclic nitrogenous resin supplied as a clear, low viscosity liquid . . . completely miscible in all proportions. *(Tank car, tank truck, 55-gal. nonreturnable drums, 5-gal. nonreturnable cans.)*	FOR COTTONS: Resists chlorine damage and laundry soil in washing . . . imparts strong dimensional stability and wrinkle recovery, with no stiffness or harshness.
RESLOOM HP	Monomeric resin supplied as a dry, stable, free-flowing powder which is readily soluble in water. (Ask for information on the various Resloom finishes.) *(300-lb. nonreturnable drums, 100-lb. fiber drums, 30-lb. nonreturnable pails.)*	FOR WOOLENS: Provides unusual shrinkage control and washability – builds body, drape and tailorability. FOR RAYON AND SYNTHETICS: Imparts lively hand, wrinkle resistance and washability to rayon and acetate suitings. FOR COTTONS: Provides *durable* crease resistance to dress goods, suitings and other constructions. For general application to all types of fibers and fabrics.
RESLOOM M-75	Melamine resin 60% solids; clear liquid with a specific gravity of 1.16. Methylated methylol melamine. pH about 10. Infinitely soluble in water. *(Tank car, tank truck, 55-gal. nonreturnable drums, 5-gal. nonreturnable cans.)*	FOR COTTONS: To impart shrinkage control with minimum "add-on." A smooth finish with crush resistance. Excellent for texturized effects.
RESLOOM* M-80	Methylated methylol melamine resin 80% solids. A heavy, clear liquid with specific gravity close to 1.2. pH about 10. Infinitely soluble in water. *(Tank car, tank truck, 55-gal. nonreturnable drums, 5-gal. nonreturnable cans.)*	FOR COTTONS: To give excellent crispness and body, wrinkle recovery, and special surface effects. FOR RAYON AND SYNTHETICS: Provides crispness and body, crease resistance, special texturized effects.
RESLOOM* M-85	Modified melamine resin, 80% solids. *(Tank car, tank truck, 55-gal. nonreturnable drums, 5-gal. nonreturnable cans.)*	FOR COTTONS: Imparts long-lasting wrinkle recovery properties, dimensional stability and hand modification.

*RESLOOM, LYTRON, STYMER, REG. U. S. PAT. OFF.





RESLOOM® U-30 — Modified urea formaldehyde, high solids. Viscous syrup with specific gravity of 1.31. Infinitely soluble in water.

(55-gal. nonreturnable drums, 5-gal. nonreturnable cans.)

FOR COTTONS: Body and wrinkle resistance when used in combination with Resloom E-50. Excellent durability when formulated for texturized effects.

FOR RAYON AND SYNTHETICS: Hand modification when used with other thermosetting resins. Stabilizes viscose, imparting wrinkle recovery.

LYTRON® S — Stable water emulsion of unplasticized polystyrene.

(Tank car, tank truck, 55-gal. nonreturnable drums, 5-gal. nonreturnable cans.)

Application to various textile fibers produces a dry, soft, full hand. Can be modified with certain film-forming latices to make box toes for shoe industries.

CATALYST AC SERIES — Four organic materials offering rapid, efficient catalysis of thermosetting resins for textile application, with minimum possibility for amine odor formation.

(Tank car, tank truck, 55-gal. nonreturnable drums, 5-gal. nonreturnable cans.)

FOR COTTON, RAYON, WOOL AND SYNTHETICS: Used with full range of thermosetting resins for maximum performance, minimum danger of residual odors.

SIZING

STYMER® LF — Vinyl resin; free-flowing, white granular material made soluble with ammonium hydroxide.

(100-lb. fiber drums.)

FOR LOOM-FINISHED ACETATES: A durable size for solution-dyed yarns. Makes it possible to weave crisp, marketable fabrics (such as taffetas) that do not water-spot or become raggy after dry-cleaning.

STYMER® S — Styrene resin; fine, free-flowing crystalline powder; freely soluble in water. pH of 5% solution 7.5-8.5.

(250-lb. drums, 50-lb. paper bags.)

FOR RAYON AND SYNTHETICS: A tough, uniform, flexible size for filament acetate and viscose. Provides clean and efficient slashing—no can covers necessary. Won't clog pipes or valves. Provides good weaving—clean fabrics, low seconds. Provides easy size removal.

For further information on any of these chemicals for the textile industry, call your nearest Monsanto sales office, or write

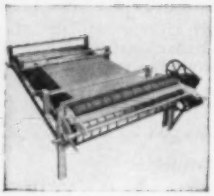
MONSANTO CHEMICAL COMPANY, *Plastics Division*
Springfield 2, Mass.
Department Room 1225

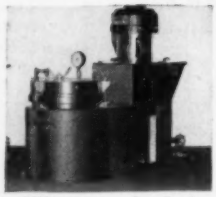
Monsanto

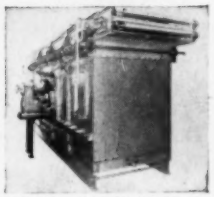
WHERE CREATIVE CHEMISTRY WORKS WONDERS FOR YOU

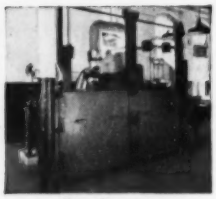
RIGGS and "From Loom Everything in Finishing Equipment for

Carbonizing Range


Cloth Storage Scray


SPT Laboratory Dye Kettle


90 yd. Sectional Acid Ager (Stainless)


Yarn Steamer

RIGGS and LOMBARD, Inc., Lowell, Mass.

- Carbonizing Ranges—Cloth
- Compacting Machines
- Crushers—Continuous
- Crushers—Semi-continuous
- Dry Cleaners—Derby—Continuous
- Dye Becks
- Dye Kettles—Piece
- Dye Kettles—Rug
- Dye Kettles—Sample
- Dye Kettles—Stock—Hy-Temperature
- Dye Kettles—Stock—Standard Temperature
- Extractors
- Fulling Mills—Cloth
- Fulling Mills—Endless Felt
- Jigs—Progressive
- Laboratory Machines
- Padders
- Pails
- Poteyes
- Pusher Mills
- Reels
- Rolls—Fulling Mills—Rubber Ring Type
- Rolls—Fulling Mills—Vulcanized Rubber
- Rolls—Miscellaneous
- Rolls—Vulcanized Rubber
- Rolls—Wood Lagged
- Shrinkproofing Machines
- Soap Distributing Systems
- Soapers—Rope
- Soaping Machines—Open Width
- Soaping Machines—Rope
- Special Machines
- Squeeze Roll Extractors
- Tanks—Size Mixing
- Tanks—Storage
- Top Dyeing Machines
- Trucks—Cloth
- Trucks—Dye
- Trucks—Pin
- Washers—Caustic
- Washers—Continuous
- Washers—Dolly
- Washers—Endless Felt
- Washers—Open Width
- Wringers
- Yarn Steamers

Cook MACHINE CO. INC., Lowell, Mass.

A Subsidiary of Riggs and Lombard, Inc.

- Agers & Steamers
- Bleach House Washers
- Bleaching J Boxes
- Compensators
- Continuous Cloth Feeds
- Cylinder Dryers
- Desizing Ranges
- Detackers
- Detwisters
- Dye Ranges
- Finishing Ranges
- Folders
- Padders
- Plisse Printing Ranges
- Roll Extractors
- Rope Bleach Ranges
- Saturators, Open Width
- Scutchers
- Selvedge Uncurlers
- Singers
- Slack Washers
- Tow Plaiters
- Washers, Open Width
- Winders
- Boil-Off

Unique Advantages Typify Each Machine In Our Complete Range

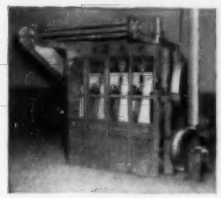
Photographs or catalog sheets briefly describing all machines listed herewith are available on request.

RIGGS and LOMBARD, Inc.
Cook Machine Co., Inc.,
Parks & Woolson Machine Co.,
Three Great Names In One

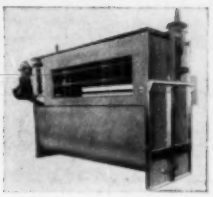
LOMBARD

to Inspection"

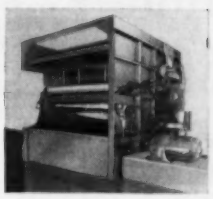
Woolens, Worsteds, Cottons, Synthetics



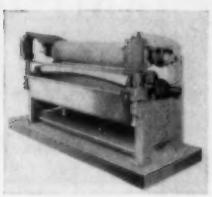
Semi-Continuous Crusher



Wash-O-Matic Bleacher



Stainless Steel Washer for Endless Felt Goods



Light Duty 2 Roll Padder

J Box (Dupont type)

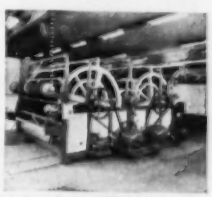
PARKS & WOOLSON MACHINE COMPANY, Springfield, Vt.

Division of Riggs and Lombard, Inc.

CLOTH:
Atomizers
Boiling Brushing
Batchers
Blades (Shear)
Blade Beaters
Boarding
Boil-Off
Button Breakers
Buffing
Burling Ranges
Carbon Duster Dry Milling
Conditioning
Conveyors
Cooling
Counters (Measuring)
Crabbing
Dewing
Decating (Vacuum)
Delustering
Despecking
Doubling
Dusting
Edge Trimming
Embossed Shearing
Examining
Expanders
Folders
Gigging
Grading and Inspecting
Gray Goods Shearing
Guiders
Ink Trademark
Inspecting and Trimming
Label Stamping
Laundry Napping
Loop Cutters and Shearing
Lustering
Mantle Steaming & Air Cooling
Marking
Measuring
Mending Tables
Metal Finders
Moth Proofing
Napping
Packaging
Perches
Piece End Sewing
Pile Fabric
Plaiters and Plaiting
Plush
Polishing
Power Perching
Presses (Apron Type)
Pumicing
Printing Selvedge
Rerolling
Rewinders
Rolling
Sanding
Scrays and Cradles
Semi-Decaters
Shearing
Shrinking
Silk Finishing
Slitting and Roll Winding
Sponging
Spot Proofing
Stamping
Steaming
Sueding
Synthetic
Tacking
Teasel Gigs
Tenter Raising
Thread Cutting
Tigering
Towel Trimming
Trade Mark
Transfer
Trimming
Tubing
Tubing and Doubling
Tubular Finishing
Unrolling
Velour Raising
Velvet
Waxing
Winding

ALSO:
Carpet Finishing
Felt Finishing
Fur Finishing
Grinders
Shear Blades
Nappers
Cloth
Knit Goods Finishing
Trico
Hosiery Napping
Sueding
Leather
Rubber

Veritex Inspecting Machine



Ten Contact Teasel Gig & Wet Brushing Machine

Universal Tubing Machine

Vertical Trimming or Greige Goods Shear

Lowell, Mass.
Lowell, Mass. (Subsidiary)
Springfield, Vt. (Division)
Triple Strength • Triple Service

Three great makers of finishing equipment combine their experience and facilities to help you improve and increase your production for profit. Write now to consult our unequalled composite engineering service.

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- Emkanol
- Emkapel
- Emkapene
- Emkaperm
- Emkapon
- Emkaset
- Emkasize
- Emkasol
- Emkatard
- Emkatex
- Emkatol M
- Emkaterge
- Emkawate
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- Rexobase
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TECHNICAL DATA SHEET NO. 166 ON AUXILIARIES NOW AVAILABLE

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For use on rayon, cotton and woolen material. Dye resistant and boil-proof, permanent, inexpensive, quick and easy to use.

For information address

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for economical, fast, efficient desizing—

DESIZE with EXSIZE

A harmless, carefully standardized liquid enzyme concentrate that removes starch quickly, cheaply, completely. Safe for all fabrics. Write for literature, sample and prices.

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Industrial Products Division

Merchandise Mart Chicago 54, Illinois

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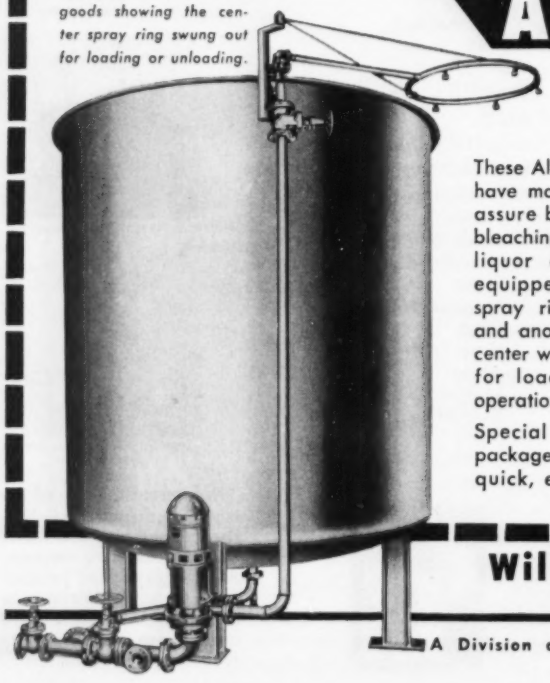
Especially Designed for Bleaching KNIT GOODS

The Allen Kier for knit goods showing the center spray ring swung out for loading or unloading.



ALLEN Stainless Steel KIERS

These Allen stainless steel kiers have many advantages which assure better, more efficient bleaching. For finest bleaching liquor coverage, they are equipped with a stationary spray ring on the periphery and another ring covering the center which can be swung out for loading and unloading operations.

Special prefabricated unit-package construction permits quick, easy installation and lower cost maintenance.

SPECIAL ADVANTAGES

- **Lower cost non-stretch operation**
- **Positive temperature control**
- **Controlled circulation for efficient bleaching**
- **Smooth stainless surfaces eliminate rust, snag and rub marks — save chemicals**

Write today for circulars giving complete information on this as well as "Package Design" cloth kiers and kiers for absorbent cotton or cotton batting.

William Allen Son's Company
SHREWSBURY • MASSACHUSETTS

A Division of O. G. KELLEY & COMPANY, Boston 22, Mass.

You need these

"WINNERS"

on your WEB-HANDLING "QUALITY CONTROL"

TEAM!

THE GREATEST COMBINATION for improving the quality of your fabric, for salability, service and profit, can be your present machinery — *plus* your processing "know-how" and planning — *plus* the installation of modern MOUNT HOPE CLOTH HANDLING EQUIPMENT at those spots in your dyeing and finishing operations where better production is needed. The best way to start toward better quality, efficiency and profit is to check the MOUNT HOPE production aids shown below — decide on those needed most in your "quality control" program, and write us for *complete* information on each — including technical data. If you want quick action — ask to have a MOUNT HOPE Engineer call for an on-the-job analysis of your problem.

MOUNT HOPE MACHINERY CO.
55 Fifth Street Taunton, Mass.
Plants at Taunton, Mass. and Charlotte, S.C.

investigate

Mount Hope

CLOTH HANDLING EQUIPMENT

"FREE WHEELING" EXPANDER

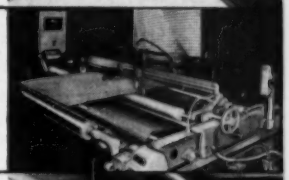
WRINKLE REMOVAL

Exact, constant width-wise stretch, assures uniform full width, wrinkle elimination, uniform tension when you use the "Free Wheeling" EXPANDER. VARI-BOW EXPANDER (not shown) is adjustable to most precise requirements at full speed.

SKEW LINER

NO SKEWED WEFT

Here is a completely automatic way to get rid of skewed weft. The SKEW LINER is a simple, rugged electro-mechanical system — just set the control and the detector unit triggers split-second corrective action — and weft is straight!



Automatic TENSION CONTROL

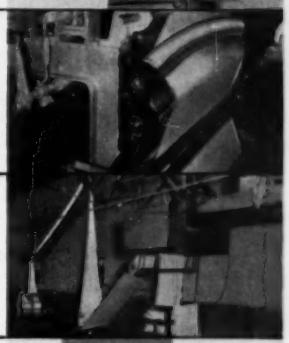
NO TENSION TROUBLES

— when you have our Automatic TENSION CONTROL, to maintain constant, uniform tension, in all winding, unwinding, conveying or similar operations. Gives sensitive, super-speed, stable control action. Simple, nearly maintenance-free operation.

SLACK SELVAGE ELIMINATOR

SLACK SELVAGE CONTROL

No more cloth damage on your shearing machines caused by slack edges when you use a Mount Hope SLACK SELVAGE ELIMINATOR. Eliminates cut selvages and wrinkles, assures even coating on coaters.



NON-STOP, TWIST-FREE

CLOTH OPENERS

BETTER CLOTH OPENING

Mount Hope CLOTH OPENING EQUIPMENT is kind to fabrics and profits! — gentle, safe, sure. No beating action, no sharp edges, no noise. Includes GUIDERS, OPENERS, TENSION SQUEEZERS, OVERHEAD SHEAVE and TURNTABLE DETWISTER.

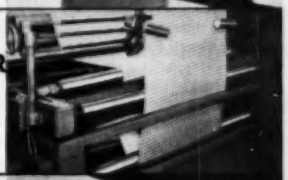
PRECISION GUIDERS

Our PRECISION GUIDERS give precise guiding for any fabric. Completely automatic. Nip rolls covered with soft, rubber-like "MH-31" for gentle, safe, sure handling. Save fabric, time, money.

BOWED AND SKEWED WEFT STRAIGHTENER

NO BOWS OR SKEWS

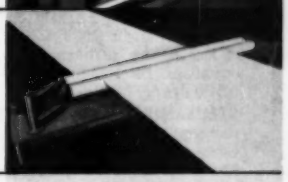
The BOWED AND SKEWED WEFT STRAIGHTENER licks the tough problem of correcting bowed and skewed weft thread — by using push-button, positive control — saving re-runs.



FLOATING ROLL GUIDE

PRECISE ALIGNMENT

The FLOATING ROLL GUIDE, with "Magic Touch" Control and nip-free rolls, provides the safest, most accurate alignment control possible. Automatically keeps fabrics within closer lateral limits.



SELVAGE UNCURLERS

NO CURLED SELVAGES

Do away with production-slowing curling of selvages with these SELVAGE UNCURLERS. Hold selvages open and flat when feeding nip rolls or tenters. Perfect for all weights and types of fabrics.

CONTINUOUS ROLL FEED

No more profit-cutting shutdowns to change rolls, with the CONTINUOUS ROLL FEED. Has non-lapping nip rolls for continuous production and tension maintenance while sewing on new rolls.

CHOOSE THE RIGHT

STANSO

Finishing Agent

For Your Needs..and Save!

DRUMMOND SOLID SOAP for fulling, scouring, soaping-off. Pure soap, with high titer, low alkali content, no fillers. Also available in flake and powdered form.

DRUMMOND RED OIL SOAP for scouring, emulsifying, cleaning. Excellent detergent, assures high rinsability with low temperatures on sensitive materials in presence of grease and lime.

STANSO POTASH FIG SOAP for scouring, emulsifying, cleaning. Scours raw wool, carpet yarns, works in any temperature range, removes oils, greases.

STANSO SCOURING OIL for scouring woolens, worsteds. In liquid form. Soluble without boiling; constant strength, good detergent. Emulsifies 8 times its own volume of mineral oil.

STANSO TEX OIL general purpose dyeing, penetrating assistant. Gives rapid wetting, good dye leveler. Used to prepare dye paste, or added to dye bath, or as softener in final bath.

STANSO SAVON all-purpose scouring solvent soap. Removes oil, graphite stains from elastic cloth, graphite stains from cotton laces, spots made by solvent dyeing assistants from dacron fabrics.

STANSOCLEN low titer scouring and fulling compound. Has built-in water softeners, provides rapid wetting, good lubricant, emulsifies oils, greases, removes dirt. Good rinsability.

STANSO PAINT & TAR REMOVER for scouring wools and worsteds. Emulsifies paint, tar spots; removes oil, grease stains. Rinses easily in finishing operation.

STANSOLENE wetting, dye-leveling agent for all materials. Used when dyeing cotton and mercerized warps. Gives even dyeing on both packaged goods and thread cones. When used in the rinse bath, eliminates "smudging" on dyed goods.

STANSO BLEACHADE wetting agent, penetrant, scouring assistant. For natural and synthetic fibers. Widely used in kier boiling, continuous bleaching operations. For scouring light shades before dyeing. Good dye leveler.

STANSAMINE synthetic detergent. Advantageous in processing, dyeing, finishing of vegetable, animal, synthetic fibers. Safe with delicate fibers, all colors.

VELGLOW finishing agent used during compressive shrinkage process. Gives calendered appearance, maximum shrinkage. Prolongs life of blankets. Efficient lubricant. No discoloration or odor.

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all-purpose marking inks

dye resist • fulling
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Oil, Waxes, Gums

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Sulphonated Tallow

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S. C.
Phone 2-3311

CIRCLE 286 ON READER SERVICE CARD

FOR
EASY-TO-FIND
INDEX
TO
PRODUCTS
AND
SERVICES
ADVERTISED
SEE PAGE 209

Five fast ways *to mix fluids uniformly*

You're sure of a uniform batch every time when you mix fluids with a LIGHTNIN Mixer accurately selected for the job.

Every LIGHTNIN is guaranteed, unconditionally, to give you the results you want. Thousands are in use.

See how these five typical LIGHTNINs fit your mixing needs, from dye house to finishing department.

PORTABLES let you convert any open tank into a low-cost mixing vessel. Direct-drive unit (left) dissolves dyestuffs and mixes thin liquids at high speed. Gear-drive model (right) mixes heavier fluids and large batches of thin liquids; stirs starch evenly and thoroughly while cooking. Thirty portable models, from ⅛ to 3 HP.

PERMANENT-MOUNTING propeller types fit any open or loose-covered tank (left) or closed pressure vessel (right). Fully assembled and factory aligned, ready to install. Direct drive; gear drive. Sizes ¼ to 3 HP. Propeller-type LIGHTNINs turn the batch rapidly over and over while rotating it, for thorough, uniform mixing in minimum time.

FOR VERY LARGE MIXING JOBS, specify a powerful Series "E" LIGHTNIN. Gives just-right balance of fluid flow and turbulence for the process. Results fully guaranteed. Hundreds of standard power-speed combinations; turbine, paddle and propeller types for open or closed tanks, top or bottom entering. Sizes 1 to 500 HP.

For quick, competent help on fluid mixing, call your LIGHTNIN Mixer representative. You'll find him listed in classified telephone directories serving these cities:

Akron, Ohio
Baltimore, Md.
Boston, Mass.
Buffalo, N. Y.
Charleston, W. Va.
Charlotte, N. C.
Chattanooga, Tenn.
Chicago, Ill.
Cincinatti, Ohio
Clearwater, Fla.
Cleveland, Ohio
Dallas, Texas
Denver, Colo.
Detroit, Mich.
Hato Rey, Puerto Rico
Houston, Texas
Indianapolis, Ind.
Kansas City, Mo.
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Los Angeles, Calif.
Memphis, Tenn.
Mexico 6, D.F.
Minneapolis, Minn.
New Orleans (Metairie), La.
New York, N. Y.
Philadelphia, Pa.
Pittsburgh, Pa.
Portland, Ore.
Richmond, Va.
Rochester, N. Y.
St. Louis, Mo.
St. Simons Island, Ga.
Salt Lake City, Utah
San Francisco, Calif.
Seattle, Wash.
Shreveport, La.
Tulsa, Okla.

In Canada
Calgary, Alta.
Montreal, Que.
St. John, N. B.
Toronto, Ont.
Vancouver, B. C.
Winnipeg, Man.

For helpful facts on mixing, plus full description of LIGHTNIN Mixers, send for these LIGHTNIN Catalogs:

- ☐ B-102 Turbine and paddle types, 1 to 500 HP.
- ☐ B-103 Top entering, propeller types, ¼ to 3 HP.
- ☐ B-104 Side entering types, 1 to 25 HP.
- ☐ B-107 Data sheet for figuring mixer requirements.
- ☐ B-108 Portable types, ⅛ to 3 HP.
- ☐ B-109 Condensed catalog (complete line)
- ☐ B-112 Laboratory mixers

Lightnin® Mixers

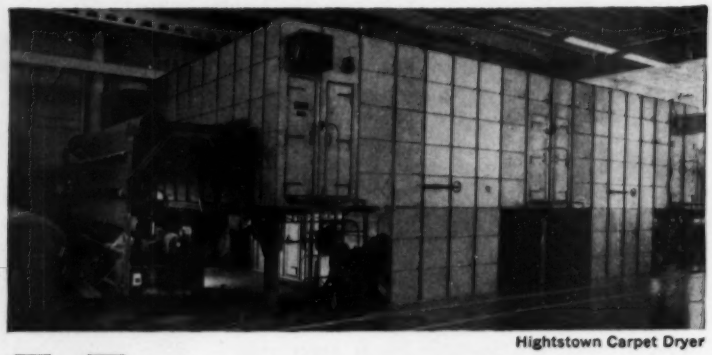
MIXCO fluid mixing specialists

MIXING EQUIPMENT CO., Inc.

179-g Mt. Read Blvd., Rochester 3, N. Y.

In Canada: Greey Mixing Equipment, Ltd., Toronto 19, Ont.

DRYERS
CURING UNITS



Hightstown Carpet Dryer

PRODUCTIVE CAPACITY · THERMAL EFFICIENCY · A & G · QUALITY FINISH ·

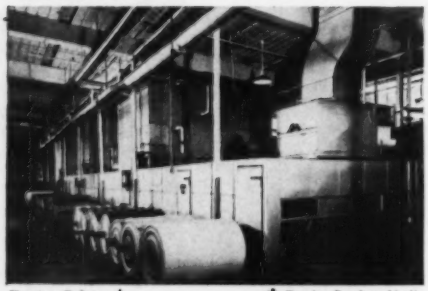
Dye Range Dryer

Proved oven and dryer designs engineered to your requirements by a firm specializing in this field for many years.

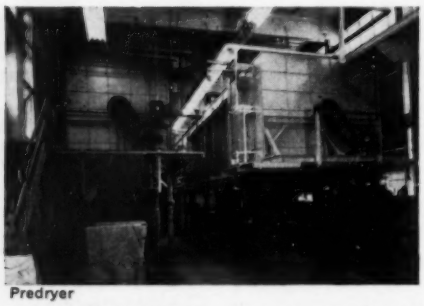
Andrews and Goodrich pioneered and perfected textile drying equipment for cotton and synthetic finishing. In starch ranges, continuous dye ranges and resin ranges, our machinery is the key to a quality finished product.

Leading mills specify Andrews and Goodrich equipment exclusively, for over the years they have discovered it yields the highest returns on their initial investment.

Please allow one of our trained sales engineers to submit a quotation on similar equipment sized for your production requirements.

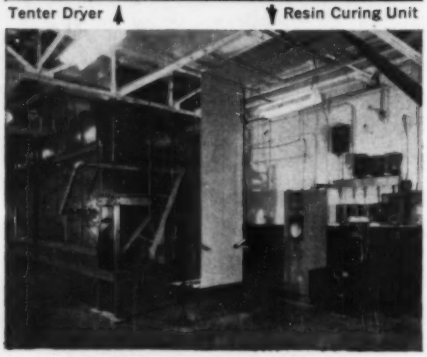


Tenter Dryer ▲ ▼ Resin Curing Unit



Predryer

M-R



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the Midland-Ross Group of Complementing Services, all affiliated and in position to contribute engineering skill to any project in the field of 'Engineered Atmospheres' or related operations.

THE MIDLAND-ROSS GROUP OF COMPLEMENTING SERVICES

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John Waldron Corporation, New Brunswick, N. J.
Andrews and Goodrich, Boston
Ross Engineering of Canada Limited, Montreal
Ross Midland Fulton, Dayton
Hartig Extruders, Mountainside, N. J.
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TENTER DRYERS	WARP DRYERS
PREDRYERS	STOCK DRYERS
DYE RANGE DRYERS	RESIN CURING UNITS
SKEIN DRYERS	CARPET DRYERS
LOOP DRYERS	CLOTH CONDITIONERS
PATCH DRYERS	LABORATORY DRYERS

ANDREWS & GOODRICH

Division Midland-Ross Corporation

336 ADAMS STREET, BOSTON 22, MASS.

Southern Representatives:
McSpadden & Scantland, Charlotte, N. C.

MAINTENANCE and ENGINEERING

New Ultrasonic Cleaning Cleans Parts Without Harm 165
Close Care of Motors Results in Top Performance 165
Power-Factor Correction 166
Load for Transformers 166
Standardize Conveyor Belts 166
Constants for Electrical Calculations 167
Stop Electrical Fires 168
Heat-Transfer Apparatus 168
Selecting Conveyor Systems 168
Maintenance of Hardwood Floors 169
Calculating Water Flow in Standard Steel Pipelines 169
Selecting Supports for Shafting 169
Care of V-Belts 170
Avoid Trap Leaks 170
Store Lubricants with Care 171
Put Out Fires With Fine Water Spray 171
Seven Check Points for V-Belt Drives 172
Standard Time for Work 172
How To Keep Moisture Out of Compressed-Air Lines 173
Newest Lighting Levels 174
Care of Motor Windings 176
Correctly Chosen Flooring Lasts Longer 176
Six Heat Sources Determine Air-Conditioning Loads 177
Operating Ventilating Fans 178
Getting Work Cooperation From Maintenance Employees 178
Accessories Improve Piping 179
Scheduled Maintenance Gives Continuous Production 180
Controlling Power Demand 180

ND FACTS

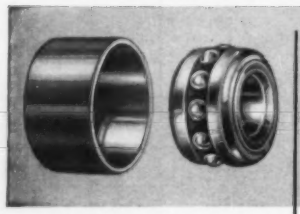
HERE'S NEW DEPARTURE'S COMPLETE LINE OF SEALED BALL BEARINGS FOR TEXTILE MACHINERY

New Departure textile bearings are made with integral closures to prevent leakage of lubricant and contamination of goods. All are smooth running, low friction ball bearings permitting higher speeds for faster production—longer service life.

Many are lubricated and sealed for life. Others use New Departure's Injection-Relubrication system. This permits revitalization of bearing lubricant for increased bearing life.

Write for full information on New Departure textile ball bearings, or call your New Departure sales engineer. Naturally, there's no obligation.

SEND FOR TEXTILE BALL-BEARING CATALOG TEX-1, NEW DEPARTURE, BRISTOL, CONN.

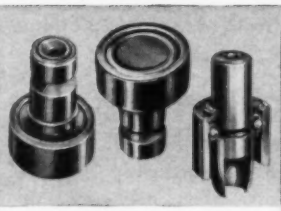


SPINDLE BEARINGS

. . . Cylindrical outer race permits removal of spindle from bolster without removing bolster from rail. Used for step bearings, but also used in high-speed spindle applications.

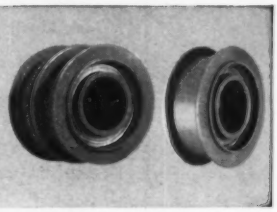
TREADLE ROLL BEARINGS

. . . permanently lubricated for long service. Designed to eliminate sparking. Double seals prevent leakage of lubricant, keep out dirt and lint.



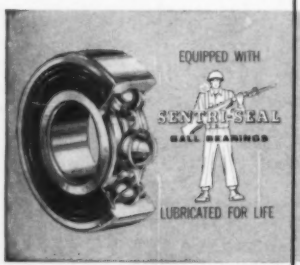
TENSION PULLEY BEARINGS

. . . available for both vertical mounting of idler or tension pulleys or horizontal mounting of tape tension pulleys.



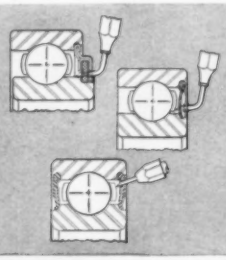
SHEAVE BEARINGS

. . . for automatic looms. Self-sealing assures protection for textiles, eliminates relubrication problem. Designed to permit nesting in gangs on harness sheave supporting shaft.



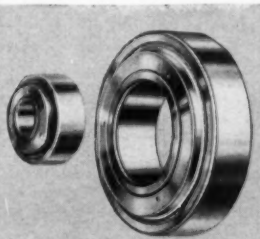
SENTRI-SEALS

. . . keep lubricant *in*, seal *out* dust, dirt and moisture for life. Sentri-Seals are synthetic rubber with spring steel rings molded in. Available in a wide variety of ball bearings.



INJECTION-RELUBRICATION SYSTEM

Hollow needle and metering oiler extend grease life in bearings for many months in high-speed, long-service applications.



FELT SEAL

. . . annular ball bearings are protected from dirt, retain lubricant by integral felt closures. Complete line from 5mm. to 2¾" bore. Relubricated by injection-relubrication.

ADAPTER BEARINGS

. . . easily applied to shafts; positive lock. Pre-lubricated, sealed. For moderate loads and speeds. Spherical or cylindrical O.D. for shafts ½" to 2 15/16" dia.

Replacement ball bearings available through
United Motors System and its Independent Bearing Distributors

NEW DEPARTURE

DIVISION OF GENERAL MOTORS, BRISTOL, CONN.

NOTHING ROLLS LIKE A BALL

New Ultrasonic Cleaning Cleans Parts Without Harm

If you need to clean delicate, precision, or hard-to-clean parts, ultrasonic cleaning may do the job for you. This new method of agitation is gaining wide application in certain types of specialized cleaning.

Agitation or mechanical force of some form is of benefit to any cleaning operation. It helps loosen soils and brings fresh detergent solutions in contact with the work.

There are many ways to agitate a cleaning solution. Pumps, air, and steam pressure are all effective.

In some cleaning tanks, the work is moved by mechanical rocker arms; in other tanks, the solution is kept in motion by propellers. A rotating cleaning barrel in another method moves both the solution and work.

Sound Waves Do the Work

The new method of agitation uses ultrasonic sound waves—sounds that human beings cannot hear.

The following explanation will (1) give you a better understanding of ultrasonic cleaning and (2) show you where it can be used to best advantage.

Sound is caused by vibration. The speed or frequency of the vibration determines the pitch of the sound. This frequency is measured in cycles per second. Sound that vibrates faster than 20,000 cycles per second is called ultrasonic, which means above the range of human beings' hearing.

This new field of harnessing fast vibrational energy is finding many applications. Some of the uses of ultrasonic cleaning to date are in smoke precipitators, laundry machines, dental drills, and equipment for detection of flaws in metal. But application to industrial cleaning promises to be one of the most important uses.

The sound waves used for cleaning are produced by transducers. These solid bodies change their dimensions when alternating current is applied to them. Current flowing through a transducer polarizes the transducer, and it becomes shorter.

When the current flow is in the opposite direction, the transducer expands to a longer size. This cycle is repeated at whatever natural frequency a given transducer material stretches and shrinks.

The make-and-break action of an electric buzzer multiplied by about a thousand times is similar to the fast natural reaction that takes place in a transducer.

When a transducer is submerged in a cleaning tank, the rapid expansion and contraction cause corresponding pressure fluctuations in the detergent solution.

On a submicroscopic scale, the liquid is torn apart and forms bubbles of cleaning liquid vapor; and then the cavities collapse. This action repeats over 20,000 times a second, or at the precise rate at which a particular transducer functions.

This cavitation or agitation in the solution occurs so fast that it cannot be seen. But its presence is proved by the effective action it has on the parts being cleaned.

What Soils Are Removed?

Ultrasonic cleaning is of greatest advantage under three conditions. It will remove difficult tenacious soils from hard-to-clean parts where scrupulous cleanliness is essential.

The difficult soils may be buffing compound, polishing rouge, lapping and honing compounds, magnetic metal powder or chips, flaw-detection compounds, and many other similar parts.

Hard-to-clean parts are parts with blind holes, internal threads, deep crevices, intricate passages, and other inaccessible areas.

Scrupulous cleanliness is necessary in many instances. For example, extreme cleanliness is sometimes necessary because of the precision of the part. At other times, a critical finishing operation follows cleaning.

There's No Danger of Breaks

Some of the items being cleaned successfully with ultrasonics are ball-bearing assemblies, hypodermic needles, clock motors, vacuum-tube parts, pipe valves, and precision parts for automobiles.

Parts are cleaned assembled or disassembled; and regardless of how fragile they may be, there is no danger of breakage.

Primarily, ultrasonic cleaning is a method to fit specific types of work, as are spray-washing machines, still or electro-cleaning tanks, steam guns, or revolving barrels.

Where parts are extremely dirty, it's best to set up a precleaning stage to remove the bulk of the soils. Some automatic systems have a spray-washing compartment for precleaning. Precleaning limits contamination of the ultrasonic cleaning solution and reduces the time required for ultrasonic cleaning.

Just as with any cleaning method, ultrasonic cleaning depends ultimately on the effectiveness of the cleaner used with it. The detergent must remove soils effectively and be safe. Other desirable qualities of the cleanser are free-rinsing, long life or the ability to resist rapid contamination, freedom from toxic fumes, and nonflammability.

Oakite Products, Inc.

Close Care of Motors Results in Top Performance

By ERNEST W. FAIR, in TEXTILE WORLD

Recognizing electric-motor troubles, correcting them speedily, and giving maintenance attention to the prevention of these troubles simplifies obtaining maximum performance from every electric motor in the mill.

Bearings that are too hot to touch or smoking may be caused by (1) a dry bearing with insufficient oil, (2) oil rings clogged by a dirty bearing, or (3) a tight bearing. On tight bearings, the bearing and shaft usually need scraping. If bearings have worked out of their slots, the bearing and shaft should be replaced.

If a shaft is out of alignment, a bearing may bind because of too much strain on the pulley. It may also loosen by vibration. If there's too much vibration, the trouble can generally be corrected by tightening the setscrews that hold the bearing in its journal housing.

Warm bearings are generally a result of an overload on the motor and heat transferred from the rotor or stator. In such instances, the load must be decreased or a larger motor used.

Smoking windings or charred wedges over the coils indicate that the bearing is worn on one side. If this defect is discovered soon enough, the bearings can be realigned or new wedges can be inserted to correct the trouble. But if the motor runs too long under these conditions, the coils have to be replaced.

When a motor fails to start, there are several reasons:

1. The voltage is too low, and there is insufficient torque. Then the voltage must be increased.

2. There's a short circuit in the stator windings caused by rough handling. The damaged coils must be replaced.

3. There's too great a load. Then the load must be reduced, or a clutch must be installed between the load and the motor.

4. Tight bearings cause friction. Bearing caps should be loosened. Then if the bearings are still too tight, they must be scraped.

Failure To Start

Failure of a motor to start when automatic controls are used is generally caused by the controls. These causes may be: (1) the solenoid is not functioning because the battery circuit is open, (2) the arms holding the circuit-breaker contacts are not working properly, and (3) the contacts are dirty or burned.

Other causes of failure to start can be detected by examining the fuses and relays, checking the starter carefully, inspecting the air gap, and removing the pulley to see if there's an overload.

Failure to start with the starter handle on and a humming sound is a frequent trouble because the starter is trying to run single-phase, an air gap is displaced, or

there is an open circuit in the stator windings.

What Causes Single-Phase?

When the motor is trying to run single-phase, one fuse is generally blown or one overload relay is out of order. Adjustment of the relay or replacement of the fuse corrects the trouble easily.

If an air gap is displaced, the bearing is out of true and should be shimmed or replaced.

An open circuit in the stator windings is caused by a short circuit that has punctured a coil or by rough handling. When a repaired motor runs with intervals of speed changes, one coil in one phase has been reversed.

When a motor starts and runs but heats while the stator is cool, the rotor bars are loose or grounded from abnormal currents in the rotor. To correct this trouble, the setscrews holding the rotor bars to the short-circuiting rings should be tightened and soldered or welded. Then the grounds should be removed.

Half-speed running on a wound-rotor motor is caused by: (1) broken connections between the windings and the collector rings, or (2) one brush is not touching, and there's an open circuit in the rotor connections. The break can be repaired, or the worn brush spring can be replaced easily.

Lagging motor speed is the result of insufficient torque caused by the rotor field in the circuit; the discharge switch is usually in the wrong position. For this trouble, the circuit between the exciter and the motor field windings should be opened. This trouble may also be caused by too great a motor load.

How To Stop Buzzing Sounds

Buzzing sounds in a motor are usually caused by a short-circuited coil or group of coils, an open circuit, or a ground. Short-circuited coils are caused by mechanical injury or broken-down insulation from over-heating. A new coil is needed. Grounds should be removed.

Burned insulation is caused by one or more coils too hot from a short circuit. The result is mechanical injury or broken-down insulation. Then the coil must be replaced.

Low growling noises are caused by a rotor out of the magnetic center of the stator. In this instance, the motor is not level or the shaft collars have shifted to leave end play on the shaft.

Variable humming sounds are usually caused by high resistance in the line (generally on long transmissions) or unstable speed of the prime mover on the alternator supplying the motor.

Use Proper Lubricant

Explosions sometimes occur in windings while a motor is running hot. The explosions are caused by dampness. Damp circulating currents between the coils, or between a coil and the ground, create a temporary ground or short circuit.

When an explosion occurs, bake the motor until all dampness is gone. Then brush the coils with a good insulating varnish. Sometimes the coils are punctured and have to be replaced.

A great deal of electric-motor trouble can be eliminated by using the highest-grade oil in sleeve bearings and the best grease in roller or ball bearings. Many motor troubles come from improper oil.

Power-Factor Correction

Existing power factor	Corrected power factor					
%	100%	95%	90%	85%	80%	75%
50	1.732	1.403	1.247	1.112	0.982	0.850
52	1.643	1.314	1.158	1.023	0.893	0.761
54	1.558	1.229	1.073	0.938	0.808	0.676
55	1.518	1.189	1.033	0.898	0.768	0.636
56	1.479	1.150	0.994	0.859	0.729	0.597
58	1.404	1.075	0.919	0.784	0.654	0.522
60	1.333	1.004	0.848	0.713	0.583	0.451
62	1.265	0.936	0.780	0.645	0.515	0.383
64	1.201	0.872	0.716	0.581	0.451	0.319
65	1.168	0.839	0.683	0.548	0.418	0.286
66	1.139	0.810	0.654	0.519	0.389	0.257
68	1.078	0.749	0.593	0.458	0.328	0.196
70	1.020	0.691	0.535	0.400	0.270	0.138
72	0.964	0.635	0.479	0.344	0.214	0.082
74	0.909	0.580	0.424	0.289	0.159	0.027
75	0.882	0.553	0.397	0.262	0.132	
76	0.855	0.526	0.370	0.235	0.105	
78	0.802	0.473	0.317	0.182	0.052	
80	0.750	0.421	0.265	0.130		
82	0.698	0.369	0.213	0.078		
84	0.646	0.317	0.161			
85	0.620	0.291	0.135			
86	0.594	0.265	0.109			
88	0.540	0.211	0.055			
90	0.485	0.156				
92	0.426	0.097				
94	0.363	0.034				
95	0.329					

Table values x kw. load = kva. of capacitors needed to correct from existing to desired power factor.

Typical problem: With a load of 500 kw. at 70% power factor, find the kva. of capacitors required to correct the power factor to 85%.

Solution: From the table, select the multiplying factor 0.400 corresponding to the existing 70% and the correcting 85% power factor—0.400x500 = 200 kva. of capacitors required.

Courtesy Westinghouse Electric Corp.

Load for Transformers

Full-load line amperes for three-phase transformers or loads

Kva.	Volts						
	208	240	480	600	2,400	4,160	13,200
1.5	4.16	3.61	1.80	1.44	.....	.....	.....
3	8.33	7.22	3.61	2.89	0.72	0.42	0.13
5	13.88	12.03	6.01	4.81	1.20	0.69	0.22
7.5	20.82	18.04	9.02	7.22	1.80	1.04	0.33
10	27.76	24.06	12.03	9.62	2.41	1.39	0.44
15	41.63	36.08	18.04	14.43	3.61	2.08	0.66
25	69.39	60.14	30.07	24.05	6.01	3.47	1.09
37.5	104.09	90.21	45.10	36.08	9.02	5.20	1.64
50	138.78	120.28	60.14	48.11	12.03	6.94	2.19
75	208.17	180.42	90.21	72.16	18.04	10.41	3.28
100	277.56	240.56	120.28	96.22	24.06	13.88	4.37
150	416.34	360.84	180.42	144.33	36.08	20.82	6.56
200	555.12	481.12	240.56	192.44	48.11	27.76	8.75
300	832.68	721.67	360.83	288.66	72.17	41.63	13.12
400	1,110.25	962.23	481.11	384.87	96.22	55.51	17.49
500	1,387.81	1,202.79	601.39	481.09	120.28	69.39	21.87
750	2,081.71	1,804.19	902.09	721.64	180.42	104.09	32.80
1,000	2,775.62	2,405.58	1,202.79	962.19	240.56	138.78	43.74

For single-phase transformers or loads, multiply the above three-phase values by 1.73.

Example: A 5-kva. single-phase transformer has a line current of 12.03 x 1.73 = 20.8 amps. at 240 v. when operating at full load.

Courtesy Westinghouse Electric Corp.

Standardize Conveyor Belts

If several conveyors are used in a plant, it is desirable to standardize on one construction for each of the belts used. This practice will simplify the problem of keeping spare belting on hand.

Courtesy McGraw-Hill Plant Engineering Handbook

Constants for Electrical Calculations

Anyone can use this table to solve plant electrical problems without a slide rule or laborious pencil work. With it, you will get accurate solutions in seconds.

Example: How many amperes per phase is it possible to draw from a transformer rated at 100 kva. 3-phase, 120/208 v.?

Solution: Table gives constants for finding unknown electrical units in terms of known ones. Using the formula I (= kva. x 1,000) ÷ (1.73 x E), for a three-phase installation, 85% pf., we find that the work can be simplified to merely multiplying the known kva. by a constant in the table. Constant is 2.779 for 208 v. Multiplying, we get 2.779 x 100, or 277.9 amps. per phase.

Wm. O'Brien in Power

3-Phase 85% pf. 80% Efficiency				11 Kv.	2.3 Kv.	480 V.	240 V.	220 V.	208 V.
$I = \frac{Kw. \times 1{,}000}{1.73 \times E \times Pf.}$		Kw.		0.062	0.296	1.417	2.834	3.091	3.269
$I = \frac{Kva. \times 1{,}000}{1.73 \times E}$		Kva.		0.053	0.251	1.204	2.408	2.627	2.779
$Kw. = \frac{I \times E \times 1.73 \times Pf.}{1{,}000}$	OR	I	TIMES	16.176	3.382	0.706	0.353	0.324	0.306
$Kva. = \frac{I \times E \times 1.73}{1{,}000}$		I		19.030	3.979	0.830	0.415	0.381	0.360
$Hp. = \frac{I \times E \times 1.73 \times Eff. \times Pf.}{746}$		I		17.346	3.640	0.757	0.378	0.347	0.328
$I = \frac{Hp. \times 746}{1.73 \times E \times Eff. \times Pf.}$		Hp.		0.058	0.275	1.322	2.642	2.882	3.049
2-Phase 4 Wire 85% Pf. 80% Efficiency				11 Kv.	2.3 Kv.	550 V.	440 V.	240 V.	220 V.
$I = \frac{Kw. \times 1{,}000}{2 \times E \times Pf.}$		Kw.		0.053	0.256	1.070	1.340	2.451	2.674
$I = \frac{Kva. \times 1{,}000}{2 \times E}$		Kva.		0.045	0.217	0.909	1.136	2.334	2.273
$Kw. = \frac{I \times E \times Pf. \times 2}{1{,}000}$	OR	I	TIMES	18.700	3.910	0.935	0.748	0.808	0.364
$Kva. = \frac{I \times E \times 2}{1{,}000}$		I		22.000	4.600	1.100	0.880	0.480	0.440
$Hp. = \frac{I \times E \times 2 \times Eff. \times Pf.}{746}$				17.775	4.193	1.003	0.802	0.438	0.402
$I = \frac{Hp. \times 746}{2 \times E \times Eff. \times Pf.}$		Hp.		0.056	0.238	0.997	1.247	2.286	2.491
1-Phase 85% Pf. 80% Efficiency				480 V.	240 V.	220 V.	208 V.	120 V.	110 V.
$I = \frac{Kw. \times 1{,}000}{E \times Pf.}$		Kw.		2.451	4.901	5.348	5.650	9.804	10.695
$I = \frac{Kva. \times 1{,}000}{E}$		Kva.		2.083	4.167	4.545	4.808	8.333	9.091
$Kw. = \frac{I \times E \times Pf.}{1{,}000}$	OR	I	TIMES	0.408	0.204	0.187	0.177	0.102	0.094
$Kva. = \frac{I \times E}{1{,}000}$		I		0.480	0.240	0.220	0.208	0.120	0.110
$Hp. = \frac{I \times E \times Eff. \times Pf.}{746}$		I		0.438	0.219	0.201	0.190	0.109	0.100
$I = \frac{Hp. \times 746}{E \times Eff. \times Pf.}$		Hp.		2.279	4.571	4.961	5.271	9.142	9.973
Dc. 80% Efficiency				220 V.	110 V.	48 V.	24 V.	12 V.	6 V.
$I = \frac{Kw. \times 1{,}000}{E}$		Kw.		4.545	9.091	20.833	41.666	83.333	166.67
$Kw. = \frac{1 \times E}{1{,}000}$	OR	I	TIMES	0.220	0.110	0.048	0.024	0.012	0.006
$Hp. = \frac{I \times E \times Eff.}{746}$		I		0.236	0.118	0.051	0.012	0.013	0.0064
$I = \frac{Hp. \times 746}{E \times Eff.}$		Hp.		4.239	8.477	19.427	33.304	77.708	155.42

Stop Electrical Fires

Electricity improperly used starts more fires in industrial plants than anything else. Half the damage from electrical fires can be prevented by periodic equipment inspections and, at longer intervals, by dismantling the equipment to check every detail likely to cause trouble.

The expense of such a program is small when measured against the consequences of an electrical breakdown and fire.

Checklist Prevents Fires

Good maintenance to prevent fires involves:

1. Keeping equipment clean and dry
2. Checking periodically for signs of overheating
3. Lubricating regularly with the proper type and amount of lubricant
4. Keeping protective devices in operating condition
5. Making sure the ratings and settings are correct
6. Setting up a maintenance schedule for important equipment

Records of inspections should be kept. They will indicate when repairs or a general overhaul are needed. Insulation tests may show that failure is imminent; then repairs can be made at the most-convenient time rather than under emergency conditions.

The inspector should be a competent electrician familiar with equipment manufacturers' instructions. He should also be aware of the need for special equipment and safeguards in hazardous locations. His equipment should include instruments, gauges, tools, and accessories required to make all necessary tests.

Wiring Failures Lead

Wiring failures are the most-frequent cause of electrical fires. Time and temperature deteriorate insulation. Continued severe loading of circuits produces overheating and causes insulation breakdown much sooner than normal.

Vibration from equipment can loosen connections or abrade insulation; overheating or short circuits result and ignite the insulation or nearby combustibles. Constant checking is needed where vibration is severe.

Sometimes equipment is unexpectedly exposed to high humidity, wetness, oily or corrosive materials, or abrasive or conducting dusts. All these conditions cause insulation to deteriorate rapidly.

Important wires or cables having combustible insulation, and grouped closely together, are especially dangerous. An arc or ground can start a fire that quickly involves all the circuits. Combustible cables should not be grouped closely together unless they are wrapped with asbestos tape and coated with a sodium-silicate solution. Cable can be bought with a fire-resistant outer braid. Grouped lead-sheathed cables burn as readily as the ordinary rubber-covered conductors because the lead quickly melts and offers no protection.

Motor Fires Come Next

Motor fires are next in frequency. Short circuits or grounding of windings occur as a result of insulation breakdown. These failures are caused by excessive vibration, oil leaking from bearings, conductive or abrasive dusts, sharp metal chips, excessive current from lighting surges or poor switch contacts, or brittleness and cracking due to age.

Many motor fires are the result of single-phasing. In a three-phase circuit, a blown fuse or a poor switch contact will cause the phase that remains in service to use more current and overheat; and eventually the windings burst into flame. If the motor is provided with appropriate running overcurrent protective devices, such fires cannot occur.

In switches or controllers, loose or worn contacts may overheat and start to arc; the result is that the covers blow open and shower the vicinity with globules of molten metal.

Electric lights should be inspected periodically to make sure protective glass globes and wire guards are in good condition. This inspection is particularly important where flammable liquids or combustible fibers are present.

Equipment Must Be Right

Other general classes of equipment such as generators, transformers, circuit breakers, and lighting arrestors operate over long periods without giving any trouble; however, scheduled periodic inspections are important because failures could cause unusually serious power interruptions.

Fire safety actually starts with the design of the equipment itself. Purchase only equipment approved by recognized testing laboratories or produced by reliable manufacturers. Install it in accordance with accepted electrical codes. Use special equipment for hazardous locations. Operate the equipment with reasonable care. And finally, inspect and maintain the equipment properly.

Courtesy Factory Mutual Record

Heat-Transfer Apparatus

In modern power plants, surface-type condensers are used since they provide pure condensed steam for boiler feed water. A study of surface condensers serving 10,000-kw. and larger turbine-generator units installed during the past several years indicates:

1. The average difference between the temperature corresponding to the exhaust absolute pressure and the cooling-water inlet temperature is 22° F.
2. A cleanliness factor of 85% is used with more than 85% of the condensers.
3. Divided water boxes are used on approximately two-thirds of the condensers.
4. The tubes used on approximately two-thirds of the condensers are ¾-in. outside diameter.
5. Two half-capacity circulating pumps, two full-capacity condensate pumps, and a twin-element two-stage air-ejector unit are used on nearly all these condensers.

Surface condensers serving smaller units are much the same, but the divided water boxes are considerably smaller. Tubes of ¾-in. outside diameter are used on most of the smaller units, and many of the units have only one circulating pump. Some of the units have only one condensate pump.

Closed Feed-Water Heaters

With higher steam pressures and temperatures for turbine-generator units, more closed feed-water heaters are used in the cycle. The heaters below the boiler feed pumps are normally designed for 5° F. terminal difference, and those above 5° F. are designed for somewhat lower terminal difference. If an appreciable amount of superheat is available, the higher-pressure heaters may use desuperheated sections. Drain cooling may often improve the cycle economy and may be either separate units or integral with the heaters.

Make-up evaporators vary in capacity from 2 to 5% of the turbine steam flow. The evaporator is usually placed about the midpoint in the feed heat cycle and is required to produce make-up with the purity of one part per million when the shell concentration is not greater than 1,000 parts per million.

Courtesy Westinghouse Electric Corp.

Selecting Conveyor Systems

The basic rules in selecting any type of conveyor system are:

1. Gravity is the most economical motive force that can be used.
2. Equipment built for motion should be kept in motion; idle equipment is expensive.
3. Continuous movement of material is more economical than intermittent movement.
4. Handling cost is generally proportional to the size of load handled.

For equipment cost to be justified it must perform one or more of the following functions:

1. Increase production
2. Reduce production cost
3. Conserve human energy
4. Increase safety.

C. H. Wolf, Dow Chemical Co., at the Seventh National Materials-Handling Exposition & Conference.

Maintenance of Hardwood Floors

Newly laid floors should be scraped or sanded lengthwise with the grain. Use No. 2 or 2½ sandpaper for cutting off high spots and joints; use No. 1 for the second cut. Finish the sanding job with No. O or OO sandpaper, or with both. This final sanding step is the most important of all because the finest finish cannot make a poorly sanded floor look good.

How To Finish a Floor

In applying finish to a floor, carefully follow the instructions given by the manufacturer of the finish. Through his own tests and experience, he knows: (1) how to prepare the floor for finishing, (2) how the finish should be applied, (3) how many coats are required, (4) how long each coat should be allowed to dry, (5) how a stained effect can best be obtained, (6) how the finished floor should be cleaned, and (7) how and when the floor should be refinished.

Follow the finish manufacturer's instructions and you can be sure of having a floor that: (1) will be easy to service, (2) will have the best appearance, and (3) will be easily kept clean and in the proper condition at the lowest possible cost.

When you ask your floor-finish manufacturer for information, be sure to mention (1) the type of building, (2) the type of floor—maple, beech, or birch—and (3) whether the floor is old or new.

Finish All Hardwood Floors

All hardwood floors should be given some kind of finish. A proper finish, correctly applied, improves the appearance of the floor and makes scrubbing unnecessary. And elimination of scrubbing adds to the life of the wood.

Modern methods of cleaning maple floors have been simplified and made cheap through buffing with steel wool, usually with electrically driven equipment. Smoother floors result; and the smoother the floor, the easier it is to clean. Floor seals can be applied and buffed in with this equipment.

What Is a Good Finish?

The requirements of a good floor finish include:

1. The finish must penetrate the top surface of the wood.
2. The finish must seal the pores to keep out dirt and resist soil stains.
3. The finish, with its penetrating qualities, must not darken the wood.
4. The finish must reflect light to improve illumination.
5. The finish should not be slippery.
6. The finish must not mar, scratch, or flake off.
7. The finish must be of such quality that worn spots can be touched up without completely refinishing the floor.
8. The finish (sealer) should be resistant to water.
9. The finish, after application, must not present a maintenance problem. It must insure economy in maintenance to eliminate constant resanding and complete refinishing.

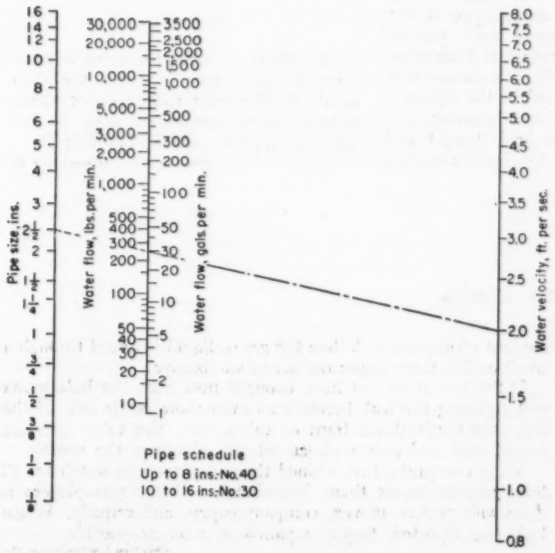
Courtesy Maple Flooring Manufacturers Assn.

Calculating Water Flow In Standard Steel Pipelines

Example: With a water velocity of 2 ft. per sec. in 2½-in. steel pipe, find the gallons per minute transported through the line.

Solution: Find the 2½-in. pipe size on the left-hand scale. Connect this point to the 2-ft.-per-sec. point on the right-hand scale with a straightedge. On the center scale at the intersection with the straightedge, find a reading of 30 gals. per min.; the adjacent scale shows this reading is equal to 250 lbs. per min. Multiplying the 250-lbs.-per-min. figure by 60 (mins. per hr.) gives an equivalent flow of 15,000 lbs. per hr.

A. J. Jackson in Power.


Pipe size, ins.
Water flow, lbs. per min.
Water flow, gals. per min.
Water velocity, ft. per sec.
Pipe schedule
Up to 8 ins.-No. 40
10 to 16 ins.-No. 30

Selecting Supports for Shafting

Bearings for mechanical transmission of power must be supported properly and substantially. Pillow blocks and hangers are two common types of supports. Pillow blocks are usually used for head shafts and individual driving. Hangers are generally used for line shafting, countershafting, and jack shafting of the modern group-drive system.

Pillow block has become another name for bearing, but it really is a housing for the bearing. The solid or split journal box is practically the only type of pillow block where the housing and bearing are integral.

The choice of the best type of pillow block to be used for a given application is governed by (1) the size and speed of the shaft, (2) amount and type of load to be carried, (3) atmospheric and mechanical conditions, and (4) accessibility and provisions for making adjustments for misalignment, expansion or wear. Other factors to consider are space limitations, first cost, replacement cost, ease of replacement, and servicing facilities.

Plates Ease Adjustments

To make alignment of pillow blocks easy, base plates with provisions for adjustment in one or two directions are available. Base plates to be used with floor stands are also available. Wall-bracket supports can be used when the pillow blocks must be carried a distance from a wall to provide clearance for pulleys, gears, etc.

Sling-type hangers with two-way adjustment can be used to support pillow blocks from a ceiling. If a shaft must operate through a wall, a base plate with two-way adjustment can be used with a steel-arch wall-box frame. The arch supports the masonry or brickwork around the opening made in the wall.

If the wall is not used for a support, the masonry around the opening can be supported by a thimble. Usually thimbles are split and are made of cast iron or sheet steel. When thimbles are installed carefully, they support the masonry, and in addition, set up barriers to the passage of fumes, fire, and dirt.

Two kinds of drop hangers are available for modern group systems of power transmission: (1) the ball and socket, or two-point suspension, and (2) four-point suspension. The four-point suspension is being used most at present.

Courtesy Power Transmission Council, Inc.

Care of V-Belts

While a V-belt does not depend on tension to provide its grip, it is dependent on tension for the extent of its grip. Fig. 1 shows how inadequate tension allows a V-belt to hang down away from the bottom of a sheave to reduce the arc of contact.

On the other hand, Fig. 2 shows a properly taut V-belt wrapped around the sheave in a full arc.

The area of V-belt contact is important because horsepower ratings for the different sizes of V-belts are based on a 180° arc of contact. But this arc varies slightly from one drive to the next, and allowance is made for the variation when the drive is engineered.

So when a properly engineered drive is delivered to you, it is assumed that proper tension and a proper contact arc will be maintained. Otherwise, slip is apt to develop.

When one or two V-belts in a set have become worn or damaged, the remaining belts have stretched beyond their original strength. This condition tends to throw the bulk of the load on new, shorter, and stronger-gripping belts added to the set. The new belts will overwork and last only a fraction of their normal life. When one or more belts have to be replaced, always replace the full set.

Maintain Proper Tension

Sometimes the lack of sufficient tautness in a drive causes all its V-belts to slip, but more often only a few belts slip to intermittently overload the gripping belts. Conversely, a loose belt occasionally whips taut across the tension side of the drive and hogs the load.

Most stretch that occurs during the life of a set of V-belts take place during the breaking-in period. However, drives should receive regular follow-up inspections for proper tension.

On drives lacking proper tension, the slack belts have a whipping action at peak loads and when the motor is started. A loose V-belt will stretch more in service than a tight one.

Don't be afraid to pull V-belts tight; stretching them slightly in adjusting tension is good for them. If you have no equipment for measuring tension in terms of pounds of pull, use this rule: a slack V-belt feels dead when you thump it with your hand; a properly taut V-belt is springy.

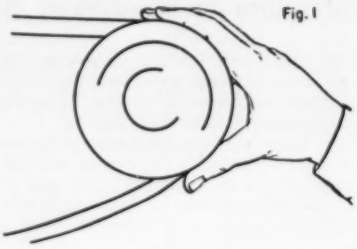


Fig. 1

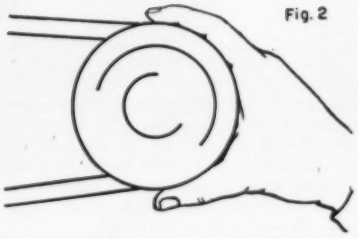


Fig. 2

Maintain Proper Alignment

A flat belt depends on tight frictional contact for its grip; a V-belt produces its own grip in the sheave. While traveling in a relatively straight line between sheaves, a V-belt has straight sides. But when it rides into the groove of a sheave and bends as it begins to circle the sheave, the bend bulges the sides of the belt; this action produces high-pressure contact between the belt and the side walls of the groove.

For this reason, one of the most important maintenance jobs is to keep the side walls of sheave grooves perfectly straight. When walls are worn out of straight, the gripping power and efficiency of V-belts is greatly reduced.

Another reason it's necessary to maintain proper alignment is that shafts of the driving and driven sheaves out of parallel draw the V-belts on one side of the set tighter, and they pull more than their share of the load.

Sheaves out of alignment also subject belts to needless rubbing on their sides; this condition wears the belt covers and builds up harmful heat.

Fig. 3 shows how to align sheaves with a cord when a straightedge is not available. A light strong cord secured around the shaft of Sheave A and stretched tight along the sides of both sheaves will touch all points indicated by the arrows if the sheaves are in perfect alignment.

Be sure the cord is held straight and tight and that it barely touches the sheaves at the indicated points. Rotate each sheave through half a turn to check the alignment. If the inner rim of either sheave indicates misalignment, it must be corrected promptly to obtain long belt life

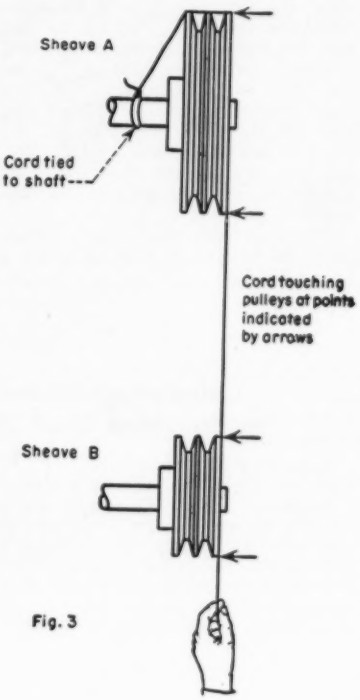


Fig. 3

Courtesy Allis-Chalmers Mfg. Co.

Avoid Trap Leaks

A careful and periodic check of valves, traps, unions, fittings, and other items can save you thousands of dollars every year.

It takes a maintenance man only a few minutes, or an hour at most, to repair the average leak. But a small leak (¼-in. size, 160 psi.) can cost $750 in one year's operation even if it requires a full day to repair it. Say a maintenance man's salary is $20 per day and material to repair a leak is $5; then your company gains $725. Remember, too, the leak will be repaired eventually; so there's no reduction in the final cost of repairs.

Steam, water, air, and other gases and liquids carry a certain amount of impurities. When the gas or liquid is forced through a small orifice, these impurities act as an abrasive.

If the leak is in cast iron, wrought iron, etc., the hole grows and repairing the leak becomes an even more costly job. If the leak is through steam traps or valves, etc., the valve seats are scored soon and only replacement will eliminate the trouble.

Many companies have trained their employees to watch for all leaks and to report them immediately. Training employees is done with posters, movies, company papers, and verbally. When leaks are reported, they're repaired as soon as possible.

Courtesy Lunkenheimer Co.

Store Lubricants With Care

By ERNEST W. FAIR, in TEXTILE WORLD

Store lubricants in a central location so that there is little handling of containers; if containers are handled little, there's less chance of damage. The storage area should be free from dust, vapors, and other forms of contamination. Indoor storage is always best.

However, in some instances outdoor storage of large drums in particular is necessary. In outdoor storage, place the drums on their sides on racks; never lay them on the ground. The old practice of setting drums upright on the ends causes accumulations of rain water, which is sucked into the drums by the normal breathing actions.

When old-time lubricants were used, water contamination could be handled by allowing the moisture to settle to the bottom of the container. Today's grease, with so many additives, must not get wet. Many of these additives are sensitive to water, and some of them may be removed partially or completely by contacting just a trace of water.

Separate Lubricants

It is best, of course, to store all lubricants in a fireproof area. Brick, tile, or concrete walls are preferred; floors should be of the same material and fitted with suitable drains. Woodwork, in addition to being a fire hazard, is hard to keep clean.

Cleanliness is often neglected in storing lubricants. The average workman thinks that the containers that house lubricants are sturdy, safe, and secure and that nothing can enter them. This thinking is not entirely correct. In addition to the disturbance of chemical balance, other contamination is possible even in the finest modern containers. When storage areas are painted in light colors, added protection is provided.

Store different brands and types of lubricants separately and in their proper places. Because lubrication requirements have become so specialized on textile machines, an error in using any given lubricant may cause serious damage to the machine.

Do not order lubricants in large quantities; discounts for large orders are small, and the discount seldom justifies the possible hazard in taking care of large amounts of stored lubricants. There is also danger of damage through changes in the delicate chemical balance of the lubricant over a long period of time.

Never apply direct heat to a lubricant container when you have to transfer it from a cold storage area to the plant for immediate use. Direct heat melts the sealing compounds on drums and results in leakage and possible harm to the product. Make the transfer far enough ahead of time to allow room temperature within the plant to heat the lubricant slowly and safely.

Don't Overexpose Lubricants

Exposure to extreme temperature, both hot and cold, can damage modern lubricants. It is better to discard a lubricant that has been subjected to extreme temperatures than to risk using it on plant equipment. Much damage to lubricant efficiency is brought about by using lubricants that have been impaired by extreme temperature.

All equipment used to transfer a lubricant from its container to the point of lubrication should be kept clean; it's best to clean the equipment each time before it's used. Only a little dust contaminates a lubricant, and unnecessary wear on bearings and other machine parts results.

Keep accurate records on lubricants, and date each container where an appreciable amount of stock is kept in storage. Then use the oldest lubricants first.

Check lubrication employees often to guard against misuse of the lubricant. When it's possible, centralize the lubrication job. Train one or more employees as supervisors; give them instructions in handling and applying lubricants to every location on every machine.

To many workers, oil is oil. This idea has no place in modern textile mills. The indiscriminate mixing of types and brands of lubricants can cause as much damage to textile equipment as the use of improper lubricants.

Supervisors must impress on every machine operator that there is a specific lubricant for his machines and that no other will do.

Put Out Fires With Fine Water Spray

Finely divided water discharged from spray nozzles or automatic sprinklers is being used more commonly recently to extinguish certain kinds of fires. Since water in small drops is very effective on many fires, this method is increasing in importance.

So that you may use this method of attacking fires more advantageously and understand its limits, you should know how water droplets react to put out various fires.

Two essential requirements for starting and maintaining ordinary combustion are: (1) a fuel and (2) an adequate supply of oxygen. Combustion stops and a fire is extinguished if either is removed.

Fuel Can't Always Be Removed

Extinguishing a fire by removing the fuel is not always practical. But in some instances such as in closing a valve on a burning gas line, it is the simplest method.

Cutting off the oxygen supply is the basis of putting out a fire by smothering or blanketing it. To put out a fire, it is not necessary to eliminate all oxygen; flaming combustion of most common materials cannot continue after oxygen is reduced to 12 to 15% by volume.

Fires are a chemical reaction, and they can be extinguished by diluting the oxygen content of the surrounding air with an inert gas or vapor. Carbon dioxide, nitrogen, and various vaporizing extinguishing agents are commonly used.

Similarly water vapor or steam may be used under the right conditions to dilute the oxygen in the atmosphere and suppress fire. In putting out fires by smothering, sprays of finely divided water have advantages.

In addition to fuel and oxygen, heat is necessary to start and maintain a fire. A combustible substance must be heated to its ignition temperatures before a fire can start. Once started, the fire is usually maintained by the heat given off.

If the seat of a fire is cooled to temperatures below the ignition temperature, the fire is put out. Sprays of water droplets have advantages as a cooling medium for extinguishing fire.

Water Puts Out Fires in Many Ways

In a recent test, 19 different water-spray nozzles or combinations of nozzles were used on fuels including wood, gasoline, kerosene, and ethyl alcohol. The extinguishing action of the water spray is a result of the combination of diluting the air supply in the burning zone and evaporation of water droplets in the heated area surrounding the fire.

The cooling effects of the water are also important factors in putting out fires. But the water droplets must be relatively small, and enough water must be used.

The increase in water surface per gallon where water is dispersed as droplets in a spray is an advantage because the rate of water evaporation and the cooling effects are proportional to the surface area if other factors are constant.

Water Droplets Must Be Right Size

However, there is a limit to the small size of the droplets since the droplets must (1) be large enough to travel from the source of the spray to the heated area around the fire and

(2) arrive with enough force to overcome the currents of hot and turbulent gases moving upward and away from the fire.

Droplets too large to evaporate completely as they pass through the zone of combustion help by cooling the unburned fuel. And even if the fire isn't put out, water spray controls the rate of burning.

The optimum average volume diameter of water droplets in extinguishing a fire is 0.012 in.

Kerosene and ethyl-alcohol fires are more readily extinguished by water spray than gasoline fires are.

When water spray is applied to gasoline fires, dilution of the oxygen supply with water vapor puts out the fire. Absorption of heat during evaporation of the droplets also helps, particularly if it occurs in or near the burning zone.

Putting out a gasoline fire by cooling the fuel with water spray is not possible because the fire point and flash point of gasoline are well below the freezing point of water.

Courtesy National Board of Fire Underwriters

Seven Check Points for V-Belt Drives

When you're losing revolutions per minute on V-belt drives, here are seven check points to help you diagnose and correct the trouble:

1. **Wrong belt tension.** Run the drive at full speed and adjust the take-up until only a slight bow appears on the slack side of the belts.
2. **Sheave wear.** A badly worn sheave robs the belt of its wedging action.
3. **Excess oil.** Keep oil in the machine, not on the V-belts. But if you can't avoid oil, use special belts for the oily application.
4. **Underbelted.** Too few belts may mean that you cannot maintain tension to carry your load. Underbelting of 20% robs you of 60% of belt life.
5. **Mismatched small sheave.** The diameter of the small sheave may not give enough wrap to pull your load.
6. **Uneven sheaves.** If groove depths and widths aren't uniform in your sheaves, you may have some loafers in your V-belts. Put them to work with new sheaves.
7. **Poorly matched V-belts.** Slack belts just ride along while tight belts do the work.

Courtesy Worthington Corp.

Standard Time for Work

If you want to reduce and control maintenance cost, you can set up maintenance standards and use them to good advantage.

A standard time for maintenance is the time it should take to perform any specific maintenance job. The job can be any one of an infinite number that might be performed by carpenters, machinists, electricians, pipe fitters, painters, and any other maintenance employee.

The maintenance standard is how long it should take to paint a wall, hang a door, replace a broken windowpane, etc.

Work Is Scheduled Each Day

The gains to be derived from proper control of maintenance work with objective standards are great. Maintenance work may be scheduled from day to day in the same way that production operations are planned. The basic requirement of a sound plan of maintenance is that all jobs have predetermined standard times established.

The primary objectives of shop planning are:

1. To provide each shop group with a planning board to be used by foremen in assigning work to employees.
2. To assure that to the highest degree possible one full day's work is laid out for each employee on the day before the work is to be done. For example, tomorrow's work is planned today, which allows a layout of adequate tools, parts, and other job preparations.
3. Translate work called for on work orders into terms of manhours, number of men required, and elapsed time.
4. To determine job priority.
5. To assign work by job priority and available manpower.
6. To follow progress of jobs to completion.
7. To develop load information necessary to size the maintenance forces properly and to be used as a guide in (a) increasing or decreasing the work force, (b) overtime assignments, and (c) subcontracting overloads to outside shops or contractors.

Scheduling of maintenance activities is segregated into two basic classifications: (1) sequence planning and (2) formalized planning.

Sequence Planning for Minor Jobs

Sequence planning refers to the planning of jobs of a repair nature in sequence of necessity. When work orders are received by a craft foreman, they are scrutinized carefully and their order of priority is determined.

A planning board with clips attached to it is furnished for each craft; each clip represents a mechanic or a group of mechanics. Work orders are assigned to individual workers or groups by placing the orders behind the proper clips. Usually enough work is assigned each craftsman for at least one day ahead. This plan of scheduling assures that the most essential jobs are given priority.

In plants where most maintenance is on minor repair jobs, the sequence plan of scheduling work is effective.

Formalized Planning for Big Jobs

In many plants, however, major maintenance requirements consist of work of a new-construction nature or large repair jobs; and a more formalized plan of scheduling is best.

For a formalized-planning schedule, work orders are selected each day in order of priority and a day's work is planned for each tradesman on a work sheet.

To use the formalized-planning schedule in your own plant, you should project all major work on a project-planning sheet (Gantt chart), which shows the sequence of operations, number of employees required by crafts, and sequence by crafts. Follow the progress of jobs daily, and note the percent of completion on the chart.

Use the estimates of other standards established in determining manhour requirements for your scheduling program. Jobs can be scheduled far in advance when they fit in with shutdown or with available dates predicted on production schedules.

Effective Planning Cuts Overtime

Priorities of smaller jobs will change from day to day, but you should review the workload periodically so that you can take corrective action before employees are overloaded or are idle. Effective planning minimizes overtime or week-end assignments.

By referring to the planning charts, you can:

1. Keep informed on over-all progress.
2. Give attention to jobs behind schedule where help is required.
3. See clearly (a) what effect rush jobs have on the jobs in process and (b) which jobs can more conveniently be delayed, if necessary.
4. Keep mill production men informed on the status of jobs in their departments without special field checks, which take a lot of time and are often inaccurate.

Periodic meetings of maintenance-department supervisors are necessary to schedule and plan work. The planning board is used here for planning major jobs and keeping up with their progress.

Work Is Planned Weeks Ahead

All work done by the maintenance department falls in three classes: (1) routine preventive maintenance, (2) maintenance authorized on work orders either by repairs or new projects, or (3) unpredictable breakdown repairs.

With proper estimating or by using

standard times for maintenance, you can classify your workload and segregate this load in the number of weeks' work ahead by each craft. This estimating can be done at any time, but it's best to do it at monthly intervals.

The ranges of weeks' work ahead can be developed for one or more plants, and the work force can be increased or decreased if the future workload falls outside these limits.

All Work Is Controlled

Standard times for maintenance jobs provide a basis for establishing control of all maintenance work. Actual times for each job are accumulated and summarized each week by craft and are compared with the standard or earned hours. Normally a four- to five-week running average is reported so that the effect of large jobs completed during any one reporting period is minimized.

Incentives can be applied to maintenance work to secure the cooperation of maintenance employees. Particularly where incentives for production employees exist, it is highly desirable to provide incentive opportunities to maintenance and other indirect employees. The productivity-measurement feature obtainable when standards are available will enable you to institute a practical way of sharing cost reduction with maintenance employees.

The extent to which craft and departmental incentives are employed depends largely on the size and complexity of the maintenance department. Therefore incentives may be designed for individual crafts or for the entire department.

Formula Determines Incentive Pay

In developing the pay formula, you must be sure that the standards have been developed uniformly. If the standards are based on data derived from work measurement and have been leveled to a normal pace, incentive earnings can be calculated on a one-for-one basis on performance above 100%.

However, if the standards are established on the past-performance basis, they must be leveled on a work-sampling basis for the one-for-one formula.

Another basis for calculating payment where historical standards are used is to agree on the percent effectiveness and to share any improvement over the present effectiveness. The one-half after 10% formula has worked successfully in many instances.

In effect, this formula admits that standards set on past practice will be loose. Rather than to level the performance down or to spend more money to establish work-measured standards, the condition is recognized and built into the pay formula.

Charles C. Winston, Ernst & Ernst, in McGraw-Hill Maintenance Engineering Handbook.

How To Keep Moisture out of Compressed-Air Lines

Wet compressed air is an expensive nuisance. It carries dirt and sediment through pipes and collects in low spots to cause water hammer, which jars loose scale, rust, and dirt in the lines. When exposed to freezing weather, it can plug or even burst piping.

All air contains some moisture. The ability of air to retain vaporized water increases as the temperature is raised and decreases as it is cooled; relative humidity is directly related to temperature. For example, air that has a relative humidity of 80% at 70° F. would be only 40% saturated at 90° F.

Pressure has the opposite effect. In this relation, air is like a sponge: the harder you squeeze it, the less water it can retain.

In a compressed-air system, air enters the compressor at ambient or atmospheric pressure and temperature. It is then compressed to a higher pressure.

This compression raises the temperature, but the air is never used at the temperature of compression. Heat is dissipated through the cylinder walls, air lines, and receiver to the surrounding atmosphere. And if an aftercooler is used, heat is dissipated to the cooling water in it.

As the air then travels through the tubing, pipe, or hose to the point of use, more heat is lost and the temperature is reduced further, possibly to room temperature or below.

Changes Cause Condensation

These changes in temperature and pressure cause the condensation that occurs in any compressed-air system, even in dry climates. For example, if free air at 50% r.h., which is rather dry for atmospheric air, were compressed to 100 psi. and cooled to room temperature, it would then have a relative humidity of 400%, a foggy condition. Any further compression or cooling would precipitate water in the lines.

There are several ways to eliminate this water from air lines. In all instances, correct piping and draining will help; but when they are not adequate, aftercoolers can be employed to condense the water before the air is distributed.

For unusual applications where cooling water is not available or where air lines must pass outdoors through freezing temperatures, special desiccant dryers may be used. The first two methods are used in the majority of installations.

Prevention Starts at Installation

Correct piping and draining often provide reasonably dry air at the point of use. Even though additional drying methods are used, attention to installation details helps provide air that is satisfactory.

One of the simplest and most effective ways to decrease air contamination and increase compressor efficiency is to locate the compressor intake outside the building on the coolest side. Because this cool outside air is more dense that indoor air, a greater quantity of air will be delivered to the compressor.

For example, if the outside air temperature averages 40° F., only 943 cu. ft. of outdoor air will be needed to deliver the same weight as 1,000 cu. ft. of indoor air —a direct saving of nearly 6%. The greater the differential between outdoor and indoor temperatures, the greater the economy will be.

Care must be taken, however, to avoid locating the intake near steam or air exhaust vents, which would add moisture to the air. The location should also be free of fine industrial dusts, lint, or any other source of contamination.

Air-Receiver Setup Is Critical

If the receiver is vertical, air should enter at the top so that moisture can fall directly to the bottom, where it will collect. The outlet from the receiver should be in the shell near the top. A drain must be installed in the bottom of the receiver and should be opened daily to remove all accumulated water.

If automatic drainage is desired, an automatic trap can be used, preferably of the inverted-bucket type. A similar arrangement should be used with horizontal receivers. The entrance should be at the head; the outlet should be in the shell on the top side near the head. A bottom drain is also required.

Air lines must be large enough to handle demands from machines and services without excessive pressure drop. These lines should be slightly pitched so that any moisture that condenses will flow in the same direction as the compressed air.

At the end of the line or at a low point in the line, a drop leg should be installed to collect condensate. Either a hand valve or an automatic trap can be used to drain this leg.

Lowered Dew Point Keeps Air Dry

Service lines should be taken from the top of the main. Although this arrangement usually requires two elbows, it guarantees that air taken from the main is dry. Any condensate in the main flows by on the bottom.

Use a check valve wherever there is any chance of liquids backing into the system from other sources, such as in air-purging systems. To remove any remaining water from the air before use, a moisture separator is usually installed in the service line immediately ahead of the point of use. The air will then be practically dry.

Completely dry air can be obtained by reducing the dew point of the air, before distribution, to a valve lower than the lowest temperature that the air will encounter in any part of the system.

An aftercooler can be used for dew-point reduction. Aftercoolers may be mounted either vertically or horizontally

for best space utilization or simplest piping.

Water flows through the aftercooler in a direction counter to the air flow so that the water inlet is at the air-discharge end of the cooler. Automatic valves may be used to control the water flow.

Discharge water from the aftercooler can then be used for compressor cooling. This slightly cooled water is better for this service than extremely cold water.

Air from the aftercooler enters the head of the receiver, and the drops of water fall to the bottom, where they are drained out. A thermometer in the cooler outlet permits the operator to make certain that the correct amount of cooling water is being used. For protection, a pop safety valve must be placed between the compressor and the aftercooler or any possible source of obstruction in the air lines.

Moisture Separator Removes Water

Any water carried through the receiver can be removed by a moisture separator. The type of separator commonly used consists of a cylindrical chamber into which the air flows tangentially to produce a swirling motion. The drops of water, which are heavier than air, are thrown to the walls of the chamber. From here, they run down into the drain at the bottom of the separator, where they are expelled automatically by a trap or manually by a valve. The air flows through a filter made of porous material that permits the passage of air but prevents the passage of water and oil.

When the separator is at the outlet of the aftercooler, it may be overburdened, for it has to remove all the moisture. It is better to place it in the line from the air receiver so that much of the moisture will first drop out in the receiver, which leaves less work for the separator. The result is drier air.

Courtesy A. N. Gustafson, Chief Engineer, Schramm, Inc.

Newest Lighting Levels

From TEXTILE WORLD

A new basis for establishing the required foot-candle lighting levels for industry was developed early in 1959 by Illuminating Engineering Society, and new recommendations for quantity and quality of illumination in the textile industry are founded on this research.

The value of lighting is determined to a great extent on the basis of benefits in relation to cost. Benefits include such things as: better production per machine per worker per square feet of factory space and improved work per employee. These benefits come primarily from better and faster seeing.

The IES tests show that some seeing jobs in the textile industry need the following lighting levels to obtain maximum visibility for maximum speed and accuracy: (1) broken yarn on a bobbin of black spun yarn, 2,900 ft.-cs.; (2) orange marks on brown tweed, 266 ft.-cs.; (3) brown stain on gray cloth, 1,100 ft.-cs.; and (4) color difference in brown cloth, 870 ft.-cs.

New Standard Is Double Old One

Newer foot-candle levels recommended by IES for textile mills are shown in the accompanying table. Foot-candles for grading and warping woolen and worsted colored goods, inspecting denims, and automatic tying in and drawing in by hand on cotton and man-made-fiber fabrics are obtained with a combination of general lighting and specialized supplementary lighting.

The new IES recommended foot-candle levels for textile mills vary from 30 to 500 ft.-cs. and are more than double the old recommendations. In most areas, the levels are below the optimum because of cost. However, the revised practice is toward better visibility and attendant benefits that come from better seeing: higher production, reduced seconds, fewer accidents, better housekeeping, and better employee morale.

In a typical textile lighting installation such as a weave room, continuous rows of fixtures on 15-ft. centers provide a maintained lighting level of 100 ft.-cs. At a 15-ft. mounting height with typical upward-light fixtures, the maximum spacing to obtain uniform lighting is 20 ft.; the minimum lighting level that can be obtained with adequate coverage is 75 ft.-cs.

If lighting levels meet IES recommendations, there will seldom be a problem of obtaining uniform illumination with two-lamp industrial fixtures.

There are many installations of lamps at 10- and 12-ft. mounting heights with satisfactory comfort and visibility results. Nearly all textile mills are now using upward lights with 30 to 35° crosswise shielding units with white sides.

These fixtures result in substantially increased comfort and more-constant light output. Where lengthwise viewing predominates, cross louvers are used.

Although most areas in a textile mill are equipped with fluorescent lamps, there are some applications for mercury and filament lamps. Recent improvements in mercury lamps result in 10 to 20% higher output than older lamps.

Fewer fixtures are used for the same lighting level. In existing installations, the new lamps raise the maintained lighting level without changing lamp wattage.

For filament-lamp installations, light output is increased 15% with the newer lamps. The result is 15% higher maintained lumens without increases in lamp wattage or lamp price.

There's variation in illumination throughout a room with any type of lights because levels tend to be lower near the walls. In many areas, it is practical to concentrate light in the vicinity of the task and allow lower levels in circulation areas.

How Supplementary Lighting Helps

Supplementary lighting is necessary in many areas of textile mills, and the fundamental problems of supplementary lighting are similar in all areas. Usually there is not enough brightness difference between the seeing task and its background.

Several lighting methods increase the brightness difference: (1) higher lighting level, (2) directional lighting, (3) reflections of luminous elements, (4) transillumination, (5) black light, and (6) polarized light.

Seeing tasks such as grading rapidly moving denims and warping colored woolens and worsteds generally involve the discrimination of fine details for long periods under conditions of poor contrast. To provide the required illumination, a combination of general lighting and specialized lighting is necessary.

The design and installation of the combination system must provide enough light; and in addition, they must provide the proper direction of light, diffusion, and eye protection. As far as possible, lights should eliminate direct and reflected glare and objectionable shadows.

Better Maintenance Is Required

Cleaner lamps and brighter lamps will of course help maintain the new IES standards. Increasing labor costs are increasing emphasis on lighting maintenance. Maintenance cages that travel alongside lighting units are one new method of greatly reducing costs where lamps are mounted at considerable height.

In some areas, lighting-maintenance companies are being used to handle the entire maintenance of lighting systems.

Group replacement of lamps is being used by more mills to reduce the cost of replacing lamps; at the same time, replacement costs are reduced for other components such as ballasts and starters.

At the end of lamp life, there is an added strain on ballasts and starters that is greatly reduced by group lamp replacement.

Lamps are generally replaced when 20% are out, and this condition occurs at 80% of lamp life. This period of lamp life is reached every 1½ to 2 years. Labor savings is 60 to 75%, which more than offsets additional lamp cost. Results are (1) over-all savings in lamp replacement costs and (2) more light.

Based on data supplied by Illuminating Engineering Society and General Electric Co.

	NEW RECOMMENDATIONS	OLD RECOMMENDATIONS
Cotton	**Ft.-Cs.**	**Ft.-Cs.**
Opening, mixing, picking	30	15
Carding and drawing	50	25
Slubbing, roving, spinning, and spooling	50	20
Beaming and slashing at comb		
Gray goods	50	20
Denims	50	50
Inspection		
Gray goods (hand turning)	100	50
Denims (rapidly moving)	500	100
Automatic tying in	150	100
Drawing in by hand	200	100
Weaving	100	50
Silk and Man-Made Fibers		
Soaking, fugitive tinting, and conditioning or setting of twist	30	10
Winding, twisting, rewinding; and coning, quilling, slashing		
Light yarn	50	30
Dark yarn	200	70
Warping (silk or cotton system) on creel, on running ends, on reel, on beam, on warp at beaming	100	50
Drawing in		
On heddles	200	100
On reed	200	100
Weaving	100	30
Woolen and Worsted		
Opening, blending, picking	30	15
Grading	100	100
Carding, combing, recombing, gilling	50	35
Drawing (white)	50	25
Drawing (colored)	100	50
Spinning (frame), (white)	50	25
Spinning (frame), (colored)	100	50
Spinning (mule), (white)	50	20
Spinning (mule), (colored)	100	40
Twisting (white)	50	25
Winding (white)	30	20
Winding (colored)	50	40
Warping (white)	50	20
Warping (white), (at reed)	100	75
Warping (colored)	100	40
Warping (colored), (at reed)	300	75
Weaving (white)	100	40
Weaving (colored)	200	80

NEWER FOOT-CANDLE LEVELS recommended by IES for textile mills are more than twice those of old standards. Foot-candles for grading and warping woolen and worsted colored goods, inspecting denims, and automatic tying and drawing in by hand on cotton and man-made-fiber fabrics are obtained with a combination of general lighting and specialized supplementary lighting.

Care of Motor Windings

Most motor failures are attributed to failure of windings. Yet the chief cause of these coil failures is the direct result of (1) mechanical trouble or (2) poor maintenance.

The most frequent cause of coil failures from mechanical trouble is overloading. Other contributing causes are: shafts out of alignment, worn bearings, excessive vibration, and sloppy repairs.

The three main enemies of coils are: (1) dirt, (2) moisture, and (3) heat. All three of these factors are easily curbed by regular inspection and simple maintenance.

Dirt—Enemy No. 1

Dirt is any foreign solid material that comes in contact with the insulation of the coil. It can be lint, dust, grease, metallic particles, or other materials.

Dirt blocks ventilation passages to cause: overheating, short circuit by acting as a conductor, and deterioration and ageing of insulation. Dirt also leads to mechanical damage of the coil when it is carelessly-removed.

All motors, including totally enclosed motors, are attacked by dirt. Fortunately, periodic cleaning checks this coil enemy. Dirt can be removed from winding by four methods:

1. Wiping with a clean dry cloth
2. Blowing it out with compressed air
3. Drawing it off by suction
4. Removing it with solvents

Moisture—Enemy No. 2

One of the most subtle motor enemies is moisture. A normal continuously operated motor generates enough heat to keep coil insulation free from moisture. A continuously operated motor is attacked by moisture from abnormal sources such as dripping pipes, accidental wetting with a hose, and exceptionally humid conditions.

Enclosure	Class A	Class B	Class H
Open	90° C.	110° C.	150° C.
TEFC	95° C.	115° C.	155° C.
TENV	95° C.	115° C.	160° C.

For excessively humid conditions, special coil insulation or treatment is necessary.

For motors not operated every day, moisture is a continuous threat. Insulation resistance of the coil insulation is lowered, and shorts and grounds result. Normal atmospheric conditions during certain times of the year, the summer rainy season, for example, cause enough day-by-day deterioration of a motor started infrequently for the motor to fail instantly when starting is finally attempted.

These failures are particularly true of stand-by motors. Where there is high humidity, motors used infrequently should be checked often with a megger to be certain the insulation value remains near normal levels.

If deterioration is progessive, the motor should be run to dry it out internally or external heat should be applied carefully before it is put in service.

Heat—Enemy No. 3

The coil insulation of a motor is generally the limiting factor of the operating temperature of the motor. The allowable temperature of insulation for three types of motors is shown in the accompanying table.

An old rule of thumb for the life of motor-coil insulation is, "For every 10° C. increase over the operating temperature, the life of the insulation is cut in half."

Heat causes insulation to age rapidly and become brittle; and this condition leads to cracking and peeling away from the coil, which results in failure.

Heat comes from several sources: poor ventilation, overload, increased resistance, and above-normal ambient temperature. Although heat is highly damaging, it is also easy to detect. In extreme instances, overheated insulation emits a characteristic odor. In normal instances of overheating, a maintenance man can tell overheating by touching or by checking with a thermometer.

Beside dirt, moisture, and heat, the life of motor windings is shortened by other electrical and mechanical causes. Although numerous, these miscellaneous defects account for so few failures they can generally be disregarded in normal preventive maintenance.

Courtesy Howard W. Lang, Westinghouse Electric Corp.

Correctly Chosen Flooring Lasts Longer

Flooring woods are made in four grades:

1. First grade. It is $\frac{25}{32}$ in. thick and thicker. The face is practically free of all defects, but the varying natural color of the wood is not a defect. This grade combines appearance and durability.

Standard lengths of all widths of this grade are in 2-ft. bundles and longer as the stock will produce. Not over 30% of the total footage of an order is bundles under 4 ft.

2. Second grade. This flooring is $\frac{25}{32}$ in. thick and thicker. Tight sound knots and slight imperfections in dressing are admitted, but it must lay without waste.

Standard lengths in all widths are 2-ft. bundles and longer as the stock will produce. Not over 45% of the total footage is in bundles under 4 ft.

This grade is made for service rather than appearance. It admits tight sound knots, prominent discolorations, numerous dark-green or black spots or streaks, slight checks not exceeding 3 ins. long and running parallel with and well inside the edges of the strip, and dark spots or streaks with slight checks in the center.

Other defects allowed are small rough spots that cannot be wholly removed by sanding the laid floor, slightly torn edges, short tongues if they are long enough to hold properly in the floor, and other small defects.

3. Third grade. It is $\frac{25}{32}$ in. thick and thicker. It must lay well and give a good serviceable floor.

Standard lengths are 1½-ft. bundles and longer as the stock will produce. Not over 65% of the total footage is in bundles under 4 ft.

This flooring is suitable for factories and warehouses where good wearing qualities are required with medium cost and appearance. This grade may contain all defects common to maple, beech, and birch, but the wood must be firm and serviceable.

It will not admit: voids on edges, knotholes over ¾ in. in diameter, partially unsound knots where the unsound portion is over 1 in. in diameter, shakes, heart checks, badly split ends, and imperfections in manufacture that materially impair the serviceability.

4. Fourth grade. This grade is $\frac{25}{32}$ in. thick and thicker and may contain defects of all character, but it must lay a serviceable floor with cutting.

Standard lengths in all widths are 1½-ft. bundles and longer as the stock will produce.

It is best to specify and use the standard run of lengths in the different grades of flooring instead of special long lengths because lengths 4 or 6 ft. long or longer are much more expensive without compensating benefits.

Modern methods of manufacturing hardwood flooring produce a larger proportion of shorter lengths than old-time methods. Now defects are cut out closer to improve the average quality of flooring.

Shorter lengths combined with longer lengths cost no more to lay. And they make as good or better floor at a material saving in cost.

Flooring is made from lumber kiln dried to the proper moisture content. After kiln drying, the lumber is cooled by air and cut into strips. Then it is milled, bundled, and stored in dry, well-ventilated warehouses.

Flooring must have this same care in handling after you receive it. To insure most satisfactory results in the finished floor, observe these precautions:

1. Don't unload or move flooring by truck in rain or snow. If atmosphere is foggy or damp, cover the flooring with a tarpaulin.
2. Don't store flooring in leaky or open buildings.
3. Don't unload flooring outside of shelter at the job.
4. Provide protected ventilation to keep relative humidity at a minimum.

Don't store or lay flooring in a cold damp building. Wait until plastering and cemented work are thoroughly dry and woodwork and trim are installed.

Don't lay flooring tight against studding or walls.

When a floor is being laid, heat the building to 70° F. and pile the flooring loosely in the building several days before it is laid.

If you observe these precautions, later development of open joints or cupping caused by moisture absorption will be prevented.

Courtesy Maple Flooring Manufacturers Association

Six Heat Sources Determine Air-Conditioning Loads

Air conditioning is the control of temperature, humidity, purity, and distribution within a conditioned area.

The size of an air-conditioning unit is designated in tons, which is a measure of the cooling capacity. A ton of refrigeration is equivalent to the cooling effect resulting from the melting of one ton of ice in 24 hrs.

As a rule of thumb, approximately 1 hp. is required to produce one ton of refrigeration at normal air-conditioning temperatures. The size of the refrigeration-machine motor is therefore a general guide to the size of the air-conditioning system.

What Is the Load?

The load on an air-conditioning system is the amount of heat that must be removed from or added to a space in a given time. This definition applies both to the load that manifests itself in terms of the actual sensible temperature of the space and that involved in the transfer of humidity since raising or lowering the moisture content requires the transfer of heat.

If heat is to be added, it is a heating load; if heat is to be removed, it is a cooling load.

To determine the cooling load of a building and thus establish the amount of refrigeration needed, you must know what produces the heat and how much is produced.

The following six sources of heat are encountered in any building:

1. Sun load. The sun shining on a building and through the windows carries heat into the building. Heat coming through the windows is felt much sooner than heat coming through the walls.

The rate at which the sun heats the walls depends on wall construction. Thick walls increase in temperature much more slowly than thin walls but hold more heat. This fact has a definite effect on conditions in the building since the walls give up their heat slowly and the effects can be felt long after the sun has passed.

The sun load varies according to season and exposure. The south load has the highest sun load in winter. During both winter and summer, the east-exposure sun load reaches its peak point in the morning and the west reaches its peak in the afternoon. The sun load on the north exposure results mostly from reflection and is therefore low throughout the year.

2. Transmission load. The heat that comes into or goes out of a room through the windows and walls, because of the difference between the outdoor and indoor temperatures, is the transmission load. On a warm day, heat travels into a room; and on a cold day, it travels from the room.

Transmission load is separate from sun load; for example, the sunny side of a building has a sun load and a transmission load but the shady side has only the transmission load.

3. Occupancy load. Since normal body temperature (98.6° F.) is higher than the desired room temperature, occupants give heat to the air in the room. In addition, people release moisture through perspiration and breathing.

4. Load from lights. Electric lights give off heat in proportion to the wattage of the light bulbs. This heat is included in calculating the cooling load.

5. Miscellaneous loads. The heat from other sources such as electric motors and machines is part of the cooling load.

6. Latent load. Excess moisture in the room is the latent load. This load comes from several sources: ventilation air, moist air infiltrating through window cracks or building openings, moisture-producing equipment such as steam pipes, and people breathing and perspiring.

All these loads are removed by cooling. Excess moisture is removed by cooling the air since air will hold only so much moisture at any given temperature.

To control room humidity, the amount of moisture to be removed from the room air must first be determined. The temperature and the air quantity at the cooling coils or water sprays is then planned to establish the moisture content of the supply air at the proper level to permit absorption of the desired amount of moisture from room air.

Sun Is the Biggest Load

For a typical room without a large number of electric motors and machines, the distribution of cooling loads is:

Sun	50%
Transmission	20%
Lights	18%
Occupancy	12%
Total	100%

This table shows that the sun is the largest part of the total room load. It is also a changing load because the sun moves from one side of the building to the other and in effect can turn on or off any time during the day. Therefore it has considerable effect on the control of the system.

Transmission, the second largest load, varies as the outdoor air temperature varies. This load is zero when outdoor air and indoor air are the same temperature, and it is negative when outdoor air is cooler than indoor air. When the load is negative, heat passes from the room to the outdoors.

Transmission is the only load that can reverse; the other loads can become zero but none will take the load from the room.

Loads Vary for Many Reasons

All the loads can vary within certain limits: the sun load varies with weather conditions and seasons; the load from lights varies by the number and wattage being used at a given time.

Occupancy, transmission, miscellaneous, and latent loads cannot be so readily defined.

During cold weather, heat must be added to a room to offset heat loss through walls and windows. Although heat is still added to the space by oc-

cupants, lights, and miscellaneous sources, the transmission loss to the outdoors may be great enough to require additional heat.

Cooling Is Required in Winter

The effect of direct sunlight may offset the outward transmission load so that cooling may be necessary even in winter.

Since outdoor air is used for ventilation, it must be warmed in winter. In a typical system, air is preheated to approximately 50° F. as it enters. Air then passes to the room after it's heated further to produce the room temperature needed by the occupants. In rooms where the heat gain from sun, lights, occupancy, and miscellaneous sources is high, supply air is used without additional heating.

During winter, both heating and cooling loads are present in a building. The sun, lights, and occupancy loads require cooling; the transmission load and outside-air load require heating.

The lights and occupancy loads are the same as in summer. The sun load is less on all exposures except the south. The sun, lights, and occupancy assist in heating a room in winter. In a room without these loads, the outside air and the transmission loss remove heat, which must be offset entirely by heating.

John H. Koonce, Carrier Corp., in Maintenance Engineering Handbook, McGraw-Hill Book Co.

Operating Ventilating Fans

Ventilation is the circulation of air and includes these factors: supplying fresh air and removing heat, dust, toxic gases, fumes, and odors. Almost without exception, any modern ventilating system requires a fan to circulate the air.

Fans are of three general types: (1) propeller, (2) axial, and (3) centrifugal. Each fan is manufactured in a large range of sizes.

They are made in many discharge positions and with either clockwise or counterclockwise rotation of the impeller. With few exceptions, they can be furnished for either direct connection or V-belt drive.

Good Foundation Reduces Cost

A good rigid foundation as level as possible is necessary for every fan installation. It insures (1) permanent alignment of the fan and driving equipment and (2) freedom from excessive vibration. Therefore maintenance cost is minimized.

The best foundation is poured concrete under the fan and all drive components. A generally accepted rule of thumb is: "The weight of a concrete foundation is at least three times the weight of the equipment it supports."

Anchor bolts set in concrete should be surrounded by pipe sleeves to allow adjustment if they are displaced when the concrete is poured. Make an allowance of ½ to 1 in. for grouting and shims to level the fan.

When a structural-steel foundation is necessary, make it rigid enough for permanent alignment. It must carry with minimum deflection not only the weight of the equipment but the loads from centrifugal forces set up by the rotating elements. Weld or rivet the entire structure well to eliminate loosening and distortion.

Install fans above the ground floor of a building over a rigid wall or column if possible. When an overhead platform must be used to support a fan, make it strong and rigid as in structural-steel foundations.

Vibration-isolating bases can be used when you want to reduce the transmission of sound and vibration from a fan and motor to other areas of a building. The base can be a resilient material, steel springs, or both. Use enough isolators and space them so that the fan is supported adequately. Always use flexible connections from the fan to the duct work.

Fans are furnished with either antifriction or sleeve bearings. Many bearings, both antifriction and sleeve, are self-aligning. But they are designed to compensate for shaft deflection only; they will not take care of bearing misalignment. When they are installed carelessly, leakage of lubricant, overheating, or complete failure may result.

Couplings Require Little Care

Couplings require little attention if they are installed properly and kept in alignment. They are called flexible couplings but they are not intended to function as universal joints. It's extremely important to install both halves concentric and parallel.

Poor installation will damage the coupling and may damage the fan, motor shaft, and bearings. Check for parallel with a feeler gauge at four points between the coupling halves: top, bottom, and two sides. Use a straightedge to check concentricity at corresponding points on the outer periphery of the two halves.

Sheaves Must Be in Alignment

Install sheaves and maintain them in perfect alignment. Fan and motor shafts must be parallel, and the centers of the grooves on both sheaves must be in perfect alignment.

When belts are installed, always move the motor so that the belts can be placed in their grooves easily. Never pry or force them on.

Belt drives depend on friction and must be under some tension to function properly. If too loose, they slip and overheat; if too tight, they place an extra strain on shafts and bearings and may stretch excessively. Correctly adjusted belts have just enough tension to keep them from slipping at full speed and load.

Frederick C. Jones, Buffalo Forge Co., in Maintenance Engineering Handbook, McGraw-Hill Book Co.

Getting Work Cooperation From Maintenance Employees

Improving maintenance effectiveness is a problem of providing proper leadership. And leadership is the ability to get workers interested in doing the job because they want to, not because they have to. The supervisor who inspires his subordinates with job enthusiasm and obtains their willing cooperation does so by leadership.

In the worker-leader relationship, the worker normally provides technical skill, tools, and experience in a chosen work. The leader in turn provides direction and standards of performance. And through good judgment, he gets the work done.

Most maintenance employees have spent many years in learning their trades; as a result, they have developed a relatively high degree of proficiency and are anxious to do their jobs well.

Likewise most maintenance supervisors possess highly specialized skills in one or more trades; and over a period of years, they have picked up some of the traits of good leadership. For this reason, they have been assigned to supervisory positions. From this acceptable-leadership situation, it is possible to move to an improved-leadership situation.

Leadership can be divided into two categories: (1) the military point of view and (2) the business point of view.

The military point of view in turn has two categories: (1) institutional leadership and (2) personal leadership.

Institutional leadership is best exemplified by a policeman standing on a corner. This policeman is obeyed because of the institution he represents and not because of any personal knowledge or personal-leadership characteristics he may have.

A maintenance worker usually responds to this type of leadership by doing exactly what he is told—no more and no less. Therefore the leader must provide very comprehensive and definite instructions.

The worker has no choice; he delivers the goods as directed.

Personal Leadership Is Better

Personal leadership is best illustrated by the captain of an amateur athletic team. A worker normally responds to this leadership with a little more enthusiasm than with institutional leadership. He is not limited by his instructions; therefore he demonstrates initiative and imagination.

The leader for his part must accept what his workers deliver in response to his general instructions and guidance. Since his instructions are not as specific as the institutional leader's, the results are not as precise. Therefore it becomes his job to provide guidance and control for the imagination and energy of his workers.

In instances of both institutional and personal leadership, the job is accomplished; however, supervisors who provide personal leadership at the contact level with workers accomplish the job a little more smoothly, and the over-all effectiveness of the worker group is greater.

Business Leader Has Three Skills

Leadership from the business point of view involves three groups of skills: (1) technical, (2) human, and (3) conceptual.

Technical skill implies an understanding of and proficiency in a specific activity, particularly one involving methods, processes, or procedures. Technical skill involves specialized knowledge, analytical ability within that specialty, and facility in the use of the special tools and technique of the specific activity.

Human or personal skill is the leader's ability to work effectively as a group member and to build cooperative spirit within the men he leads. Human skill is concerned primarily in working with people.

Conceptual skill involves the ability to see the enterprise as a whole. It includes recognizing that the various functions and segments of the organization depend on one another and how changes in one part of the organization affect all others. It is the sensing of the organization as a whole and the total organization relevant to it.

Skills Must Be Balanced

Normally the first-line maintenance supervisor possesses a high degree of technical skill, a moderate degree of personal skill, and only a small amount of conceptual skill. The middle-management supervisor possesses a relatively high degree of personal skill and limited amounts of technical and conceptual skills. The top-level maintenance manager requires a high degree of conceptual skill, a relatively high degree of personal skill, and enough technical skill to develop a proper understanding of the maintenance operation.

It is essential that the maintenance supervisor, regardless of his level, achieve the proper balance among these three types of skills. The assistant foreman must possess a high degree of technical skill because his workers are looking to him for guidance and direction; he must have a certain amount of conceptual skill to properly motivate his people; and he must have a high degree of personal skill to maintain satisfactory interpersonal relationships with all of his employees.

If he moves up the supervisory ladder, he must change the balance of his skills to meet the changed requirements of his assignment.

It is not possible for plant engineers or maintenance superintendents to provide proper leadership for their work groups merely by possessing pure conceptual skills or pure technical skills. They must maintain an adequate balance of skills that include human or personal skills.

Supervisor Can Improve Himself

Many tools are available to the supervisor who wants to improve his personal skills to gain the cooperation of his maintenance workers, and there are many things a company can do to assist the supervisor in achieving this goal. Most of these tools include communications:

1. Regularly scheduled supervisory meetings
2. Special meetings of worker groups to explain particular tasks
3. Use of company newspapers to credit maintenance-department achievements
4. Employee-counseling programs
5. Presentation of service pins, suggestion awards, and other employee recognition items

In addition to improved communications, several other tools help the supervisor improve the worker's effectiveness:

1. Competitive programs
2. Special awards for safety, housekeeping, or any other subject that needs highlighting
3. Suggestion programs.

Wallace E. Fare, North American Aviation, Inc., at the Ninth Plant-Maintenance & Engineering Conference.

Accessories Improve Piping

When piping systems are being designed or installed, there are many places where small accessories are both useful and practical; we call these accessories "trinkets." In many instances, piping will actually operate without the trinkets.

However, the piping can be operated more efficiently and conveniently if trinkets are added; and sometimes there's greater safety and economy. When piping trinkets are added judiciously, they pay their own way quickly.

Take pressure regulators, for example. A simple form of pressure-regulator installation consists of a flow line, gate valve, 100- to 20-psi.-ga. pressure regulator, gauge and siphon, and a 20-psi.-ga. steam line to the process.

This hookup not only represents the utmost simplicity but also is workable. However, this installation is the very minimum of equipment. It does not have any provision for contingencies, operating ease, or safety.

By adding a few useful, justifiable trinkets, you have a much better system. Put a gate valve on each side of the regulator, and add a bypass. The bypass lets you remove the regulator for repairs without interrupting service.

Simplifying only one such maintenance operation on the regulator will more than offset the cost of the piping and trinkets added. The proper sizing of bypasses and the right type of valve are of course important.

Install a strainer with a blowoff ahead of the pressure-reducing station. This strainer protects the regulator and valves against foreign matter in the piping. It also provides a means for removing accumulated water before the system is restarted after a shutdown.

Add a relief valve as a safety measure; it protects the low-pressure piping and connected equipment by precluding damage that can occur if the regulator fails to function properly and allows the pressure to build up on the low-pressure side.

There are hundreds of common valve installations where hand-operated valves are well above the plant floor level. To operate these valves, the attendant must use a ladder or climb stairs to a catwalk.

A piping trinket that offers an improvement to the hard-to-read valve has a simple chain wheel and chain. This trinket permits operation from the floor, eliminates inconvenience, saves time, and promotes safety. If the valve is operated frequently, the chain-wheel operator is a worth-while piping trinket.

Two Solutions Ease Operations

In other instances, extension stems can be applied to overhead valves if service conditions make it feasible to install the valves in upside-down positions.

Or perhaps you have valves below the plant floor level. Then you again have lost time for operation. For this installation, you have two solutions: (1) extension stems for smaller valves and (2) extension stems with stands for larger valves.

There are other devices for operating valves in inaccessible locations; one is an electric-motor operator. However, chain wheels, extension stems, and floor stands

for simple installations are always justified in good planning.

Trinkets for drips and drains are relatively small in size but can be big in importance.

Many piping systems do not have adequate drips and drains. This piping is workable up to a point, but it is the minimum in equipment. Damage may be occurring, and there are potential hazards.

The omission of one small valve in a vital spot can cause trouble; and the addition of that valve can be a wise investment.

The American Standards Association code for pressure piping is explicit:

"Suitable drains or drips shall be provided wherever necessary to drain the condensate from all sections of piping and equipment wherever it can collect. Suitable drains also shall be provided to empty water lines, water storage tanks, equipment containing water, etc. when such piping and equipment are out of service. At least one drain valve shall be placed in each drain line."

George W. Hauck, in Crane Valve World.

Scheduled Maintenance Gives Continuous Production

A standard method is needed in every plant in adopting and carrying out a maintenance program. These methods are known by several terms including: preventive maintenance, scheduled maintenance, controlled maintenance, planned maintenance, and productive maintenance.

But no matter what the program is called, the general purpose in adopting such a program is to maintain continuous production.

Not many years ago, maintenance was handled by the mill master mechanic, and handled well. He carried a first hand knowledge of machine weaknesses in his head; and often he carried the remedy for their ills in a notebook in his hip pocket.

Unusual machine data not readily in mind was filed in one of a series of small notebooks always close at hand.

However, through the years, more-complex equipment has been added: automatic machines, multiple-operation machines, and electronic controls.

Master Mechanic's Job Is Greater

General equipment of much greater technical nature has required the expansion of the master mechanic's job to a complete maintenance organization. This organization is complete with its own managers, engineers, machinists, clerks, and laborers.

The notebook filing system has been replaced with libraries of parts catalogs, data books, filing cabinets, and card systems. And the organization has the necessary personnel to keep the filing system up to date.

Because of the complex nature of industry today, no member of a maintenance group knows every piece of equipment in a plant; and often no one knows everything about any one machine.

Therefore maintenance has become highly specialized and must be treated like production departments of a mill that are necessary to its successful operation.

Maintenance System Is Necessary

A well-planned and well-executed maintenance system is now essential to any plant because:

1. It makes the over-all job easier. Planned maintenance operations minimize costly rush breakdown periods that disrupt production schedules.

2. Production is increased automatically because preventive maintenance is performed at scheduled periods fitted into production schedules. The maintenance program includes scheduled shutdowns for inspection and repairs at prearranged times when production departments are affected least.

3. Increased production lowers the cost of the product manufactured.

4. Scheduled inspection and adjustment of equipment produce high-quality products.

5. Working conditions are improved, and better employee relations result. And in turn, there are fewer production stoppages from labor problems.

All top-management men in a plant desire some sort of maintenance program because they are constantly looking for easier and better ways of doing their work. In addition, they want to increase production, improve quality, and make higher profits.

Adopting a maintenance program does not require an initial outlay of capital. The scope of the program adopted must be designed to fit the specific needs of the individual plant.

But regardless of the size of a maintenance operation and the money budgeted for specialists, filing systems, and renewal parts, the program will not be successful without the full understanding and cooperation of every member of the organization.

Scheduled Maintenance Pays Off

Although management men often object to the establishment of a maintenance program, they do not object after such a program is operating efficiently. For example, a maintenance program was established by the plant engineer of a group of mills in Georgia. After three years of operation, motor losses were down from 900 hp. per year to 200 hp.

J. C. Williams, Westinghouse Electric Corp., at a meeting of the American Institute of Electrical Engineers at Georgia Tech

Controlling Power Demand

Mill A—"In starting up the mill after the week-end shutdown and after power failures, we start all motors larger than 25 hp. one at a time. Then we start smaller motors by lines.

"High voltage during shutdowns burns out an excessive number of light bulbs. We do not have a method of correcting the burn-outs. However, we don't have too much trouble because we have capacitors.

"Since we installed capacitors about 10 years ago, our voltage chart remains uniform without a visible peak demand."

Mill B—"The best bet in keeping the power factor down during the start-up is to have the mill warm, especially in the winter. When machinery is cold, it takes a long time to start up.

"We do not have high voltage on our lights during shutdowns. The regulators on our supply line from the substation hold our voltage constant.

"Our electric meter has a demand meter-recording chart. We check the demand load each day. When the peak load is the same day after day, we change our operations slightly to even the load."

Mill C—"Our system for starting up the mill after shutdowns is: (1) start air-compressor motors; (2) card room, start all 20-hp. motors or over one at a time; (3) spinning room, start all 20- and 25-hp. motors one at a time; and (4) weave room, the switch is thrown, and then each individual loom motor is turned on.

"High voltage during shutdowns burns out light bulbs. We changed from 120-v. bulbs to 130-v. bulbs and have fewer burn-outs."

Courtesy Alabama Textile Operating Executives

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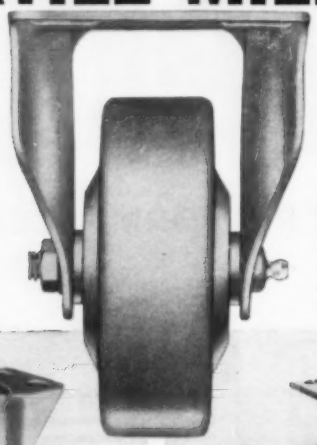
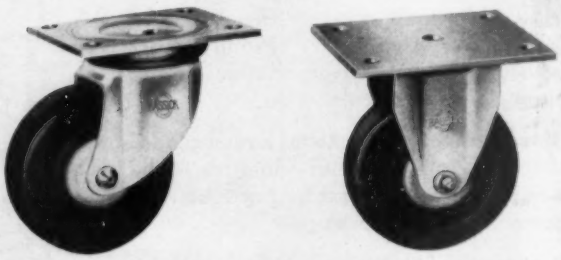
FACT FILE ON CASTERS FOR TEXTILE MILLS

Reduced maintenance and longer life under the special conditions encountered in textile mills are two big features you can get when you use casters designed specially for your job. Bassick's complete line of textile casters features carefully designed and formed thread guards, locked into position. Adequate clearance between legs of caster and thread guards is provided by a unique spacer washer construction. 4" and 5" metal wheels in all of these casters are supplied with top quality ball bearings in the hub to insure easy rolling and long life.



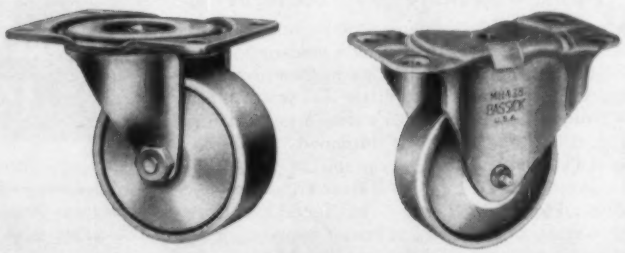
Ideal Doffing-Truck Caster is either 4381-2B-1A or 5381-2B-1A. The 4" and 5" metal wheels in these economical, rigid, structurally shaped casters have fully machined faces with rounded tread edges for maximum floor protection, and a ball bearing unit in the hub for ease of rolling.

For Hamper and general purpose use, these special Bassick textile casters feature non-marking, high impact wheels. Two sizes: 3½" (No. 35399F-1x384) and 4" (No. 4389F-1x382).



Easiest Swivel Action under heavy loads results from the double-ball-race construction of the Bassick "H99-1A." These highest quality swivel casters come in 4", 5" and 6" sizes with metal, "Baco" soft tread or "Atlasite" hard composition wheels. Matching rigid series "H98-1A" available in all sizes.

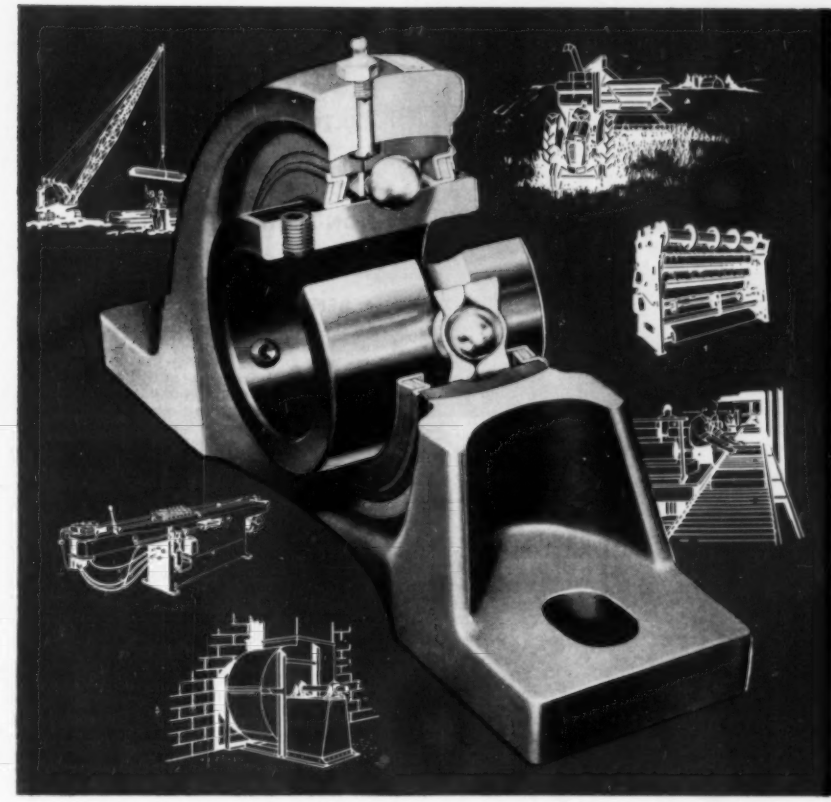
Full-Floating swivel action and 3½" high-impact, non-marking "Atlasite" wheels are outstanding features of this special textile caster. Catalog No. 35689F-1x383.



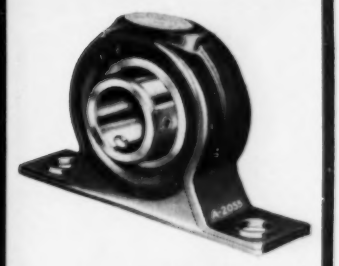
Tops for durability and economy, Bassick Series "61-1A" swivel and "38-1A" rigid casters come in 4", 5", or 6" wheel sizes and a variety of wheel types, including high-impact non-marking "Atlasite." All of them, of course, are equipped with the Bassick spacer-washer thread-guard construction.

Ask your Bassick industrial distributor for complete data on these and other Bassick textile casters. See him today or write for Textile Bulletin #TEX-125-58. THE BASSICK COMPANY, Bridgeport 5, Conn. *In Canada:* Belleville, Ont. 9.72

Symbol of SW Excellence — Bassick — A DIVISION OF STEWART-WARNER CORPORATION



"LP" PILLOW BLOCK



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...quality that builds acceptance!

There is no greater assurance of performance than quality. SEALMASTER gives you that quality in a complete line of ball bearing units, providing a wide range of mountings in shaft sizes from ½" to 4 15/16".

Patented SEALMASTER "Zone Hardening" affords simplified, secure locking to shaft. One piece housings eliminate loose pieces that increase your assembly costs. And when cost is a primary requisite there's no need to sacrifice quality.

The new SEALMASTER "L" Series provides a precision, low-cost line of self-aligning ball bearing units. They are permanently sealed and pre-lubricated with a high grade lubricant for long life.

SEALMASTER rubber mounted units provide extremely quiet operation where noise is an important factor.

Whatever you look for in a bearing unit — quality — performance — economy — there's nothing comparable with SEALMASTER!

WRITE FOR CATALOG 454.

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BALL BEARING UNITS

SEALMASTER BEARINGS
A DIVISION OF
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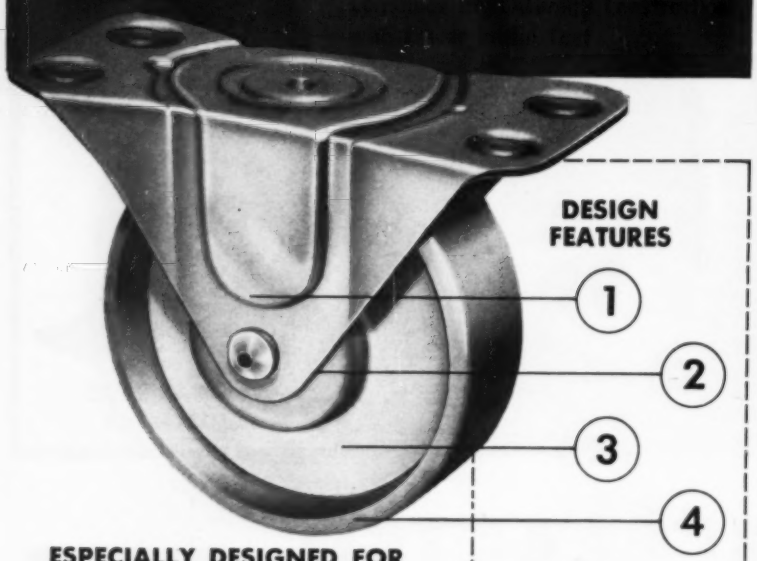
CIRCLE 183 ON READER SERVICE CARD 183

NOELTING

Faultless Casters

Faultless Textile Casters



ESPECIALLY DESIGNED FOR

- **DOFF BOXES**
- **LAP TRUCKS**
- **ROVING TRUCKS**

Here, in this new Faultless 500 Series Textile Caster all of the features textile men require—deep drawn thread guards and lower initial cost—are combined to give a rigid caster that assures freedom from snagged threads that stop production. Sealed wheel bearings available if desired. Load capacity 175 lbs.

Faultless castered equipment can lead the way to reduced costs and increased production in your own plant. Casters for light, medium, heavy and special duties are included in the extensive Faultless line.

1 Drawn steel construction deeply corrugated to carry maximum rated loads with a substantial safety margin.

2 Ball bearing assembly in hub to absorb side thrust.

3 Deep drawn thread guards fit snugly between wheel hub and caster horn — assure maximum protection, trouble-free operation.

4 Semi-steel wheel has fully machined face with generous radii at tread edge.

ASK YOUR DISTRIBUTOR

Your nearby Faultless Industrial Distributor maintains a substantial inventory of Faultless Casters for immediate delivery. He and one of the strategically located Faultless Sales Engineers are available to work with you on every handling problem in your plant. Both are listed in the Yellow Pages of your phone book under "Casters," beneath the Faultless heading. Write for complete information.

QUALITY

TEXTILE LUBRICANTS

G-C has a complete line of NON-MELTING lubricants for all types of textile equipment.

- **BEN BOY**

Recognized as the world's finest lubricant for use at high or low temperatures on fast or slow ball or roller bearings. Lasts TWO to FOUR times longer than CONVENTIONAL lubricants. Can be used on slashers, dryers, tenter frames, dry cans, calenders, looms, finishing equipment, or any type grease fitting.

- **NON-MELTING OILS**

Perfect top roll and comb box oil. Can be used on any application that requires an oil that won't splash, creep or drip. Recommended for carding, spinning, comb boxes, oil type motors and loom oiling. First NON-SOAP lubricant introduced to textiles.

- **WHITE STAR SPINDLE OIL**

Clear, water white oil for use in both spinning and twisting. Has rust and oxidation inhibitors. Gives longer life to bolsters. Approved by spindle manufacturers.

- **TWISTER RING LUBRICANTS**

Contains no tallow, lard or fatty acids. Colorless, it will not melt, because it resists heat. Get more production, less ends down. The longest-lasting twister ring lubricant on the market.

- **LOOMAL G-350**

A combination gear and cam lubricant; can be used as a general purpose lubricant.

- **GEARCO A & W**

A semi-fluid chain and gear lubricant for mills who prefer a semi-fluid type lubricant instead of a grease.

GEORGIA-CAROLINA sales-service men know the textile industry. Each on his own can help you solve your lubrication problems. By using multi-purpose quality lubricants, you get better lubrication, decrease costs and get higher production.

GEORGIA-CAROLINA will welcome the opportunity to prove G-C Lubricants are the finest quality sold to the textile industry. Write, wire or call for complete information at no obligation.

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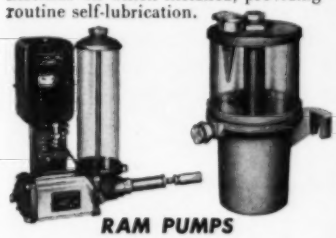
NEW LINCOLN CENTRALIZED LUBRICATION SYSTEMS

ELECTRO-LUBERS

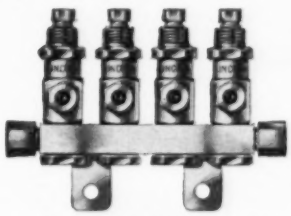
Compact, efficient electric-powered lubricant pumps supply oil or grease to banks of injectors in a centralized system. Become integral part of individual machine on which installed, providing routine self-lubrication.



RAM PUMPS

High or Low Volume Output

Low-cost, easy-to-install. Systems designed to provide automatic or semi-automatic lubrication of bearings, simultaneously, on single machine units while in operation. May be actuated mechanically, electrically, or manually. Dispense oil or grease.



MICRO-MEASURE SYSTEM

Miniaturized system pre-measures and injects fluid lubricants to millionths of an ounce, providing a totally new type of automatic lubrication. Can be automatically cycled as often as every 3¾ minutes. Insures constant application of pure lubricant adjustable to individual bearing requirements. Can save you more than its total cost in a few weeks.

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Complete facts on HOW TO REDUCE OPERATING COSTS through MODERN LUBRICATION METHODS

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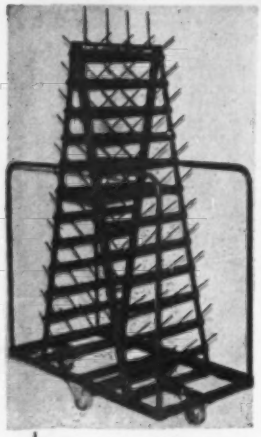
A Complete Line of Materials Handling Trucks



Excel No. 3400
Pin Truck
for Twister
Bobbins, etc.

CAPACITY: made to customer's specifications to carry size and quantity of bobbins desired.

CONSTRUCTION: Angle iron base and A frame. Cold rolled steel pins, pipe handles, and guard rail.

Electrically welded throughout (except casters) for strength and rigidity.

Ball bearing pressed steel casters are bolted onto base.

FINISH: Painted Saco-Lowell blue-gray.

Excel No. 2500
Corrugated
Metal Bobbin
and Yarn Truck

CONSTRUCTION: 20-gauge galvanized sheet metal, corrugated for extra strength. Spot welded, riveted, and electrically welded for permanent strength and durability. One inch non-rusting tubing top-rail. Solid or slotted metal bottom.

Best quality construction and workmanship throughout.

Also:

No. 100 Loose Doff Box
No. 200 Doff Box Frames
No. 300 Doff Truck
No. 400 Slatted Yarn Truck
No. 500 Metal Yarn Truck
No. 600 Slatted Conditioning Truck
No. 700 Waste Can Truck
No. 800 Platform Truck
No. 900 Metal Conditioning Truck
No. 1000 Fibre Truck
No. 1100 Steel Lap Truck
No. 1200 Utility Fibre Truck
No. 1300 Utility Metal Truck
No. 1400 Comber Lap Truck
No. 1500 Pin Board Truck
No. 1600 Bale Opening Truck
No. 1700 Cone Truck
No. 1800 Beam Truck
No. 1900 Sliver Can Truck
No. 2000 Swing Bed Doff Truck
No. 2100 Battery Filling Truck
No. 2200 Rack Truck
No. 2300 Fibre Truck
No. 2400 Stainless Steel Dye House Truck
No. 2600 Textolite Dye House Truck
No. 2700 Special Fibre Roving Truck
No. 2800 Corrugated Round End Metal Truck
No. 2900 Double-decker Trident Truck
No. 3000 Automatic Roving Truck
No. 3100 Pin Board Carrier Truck
No. 3200 Card Grinder Truck
No. 3300 Spinners Creel Truck
No. 3500 Special Plywood Cloth Trucks
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EXCEL INC.

"Excel Trucks Excel"

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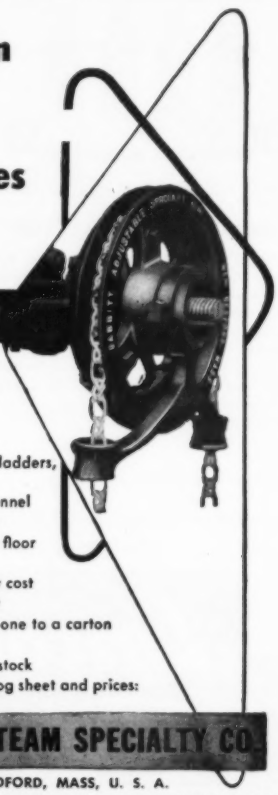
Safe Operation of Overhead Valves with a Babbitt

Adjustable
SPROCKET RIM
with Chain Guide



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- Prevent accidents, protect personnel
- Reach inaccessible areas easily
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- Easy to install and operate
- No maintenance; first cost, *only* cost
- Easy instructions with each unit
- Packed, completely assembled, one to a carton
- Fits any size valve wheel
- Your supplier carries complete stock
- Write for new descriptive Catalog sheet and prices:

Babbitt STEAM SPECIALTY CO.

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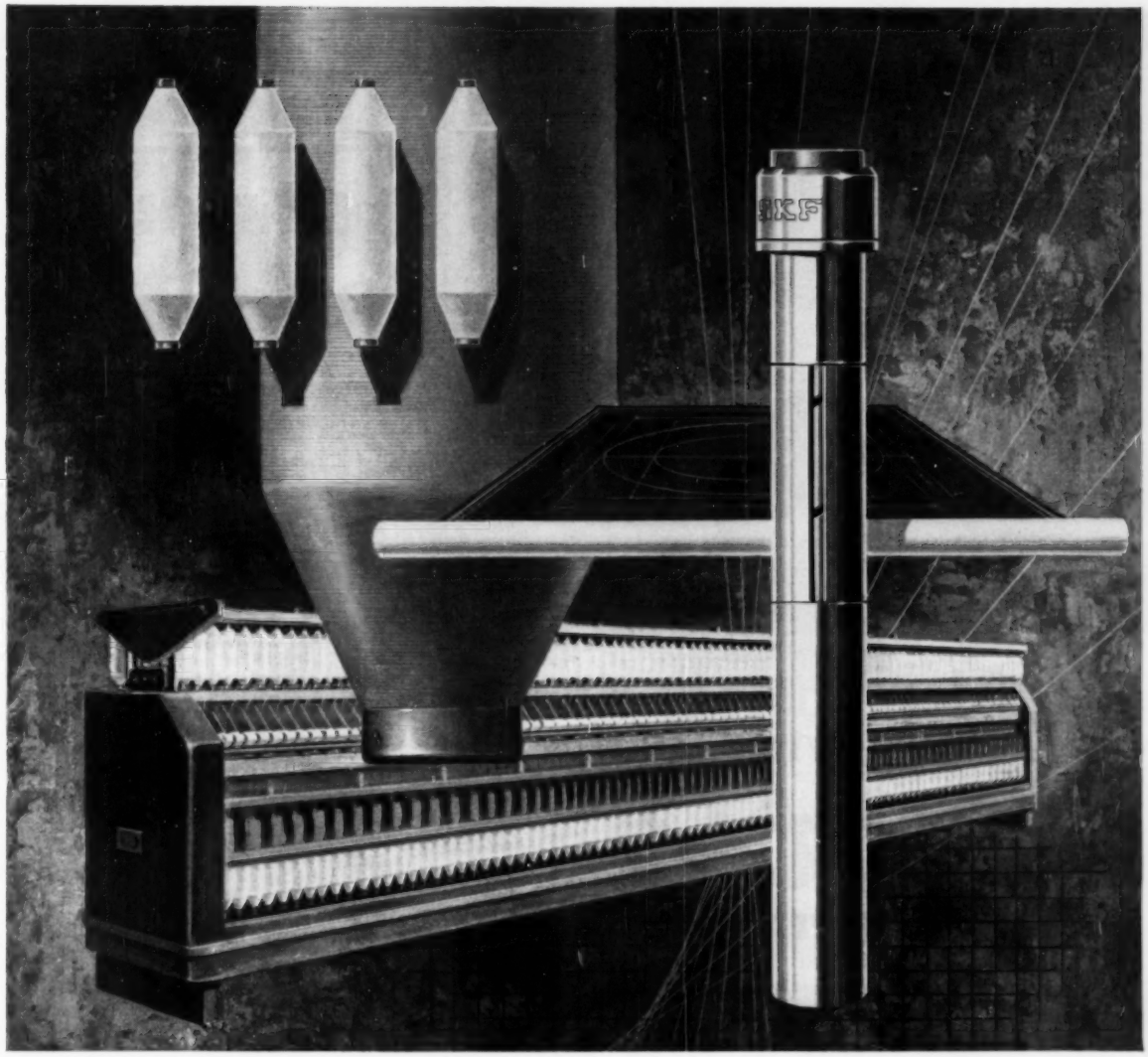

This new SKF bolster belongs in every plan for heavy-package, high-speed frames

This is our new "HF" Series Anti-friction Bolster—designed especially for textile spindles carrying heavier packages and operating at higher speeds. It promises you more profitable production through increased spindle efficiency and major operating economies.

For example, this new bolster reduces spindle maintenance to a minimum. Relubrication cost is reduced to a minimum. And you save on power—because, in many cases, cylinder RPM can be cut without affecting spindle speed or frame efficiency.

Sound right for the heavier package, faster frames you're planning? Wait till you see its smooth acceleration, vibration-free operation and precision "plumbing"! They're additional reasons why you should *specify SKF-equipped—and accept no substitutes.*

For details, call GArfield 6-6400 or write: Textile Sales Division, SKF Industries, Inc., P.O. Box #6731, Philadelphia 32, Pa. 5930

Spherical, Cylindrical, Ball, and "Tyson" Tapered Roller Bearings

EVERY TYPE—EVERY USE

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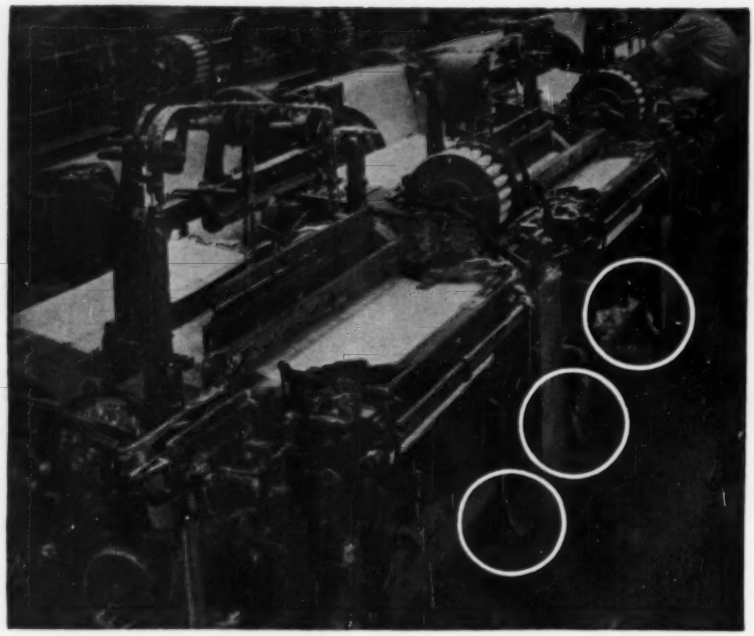

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IN SIX WAYS

1. **WESTSORB mounting** pads permit quick and simple installation of machines without damage to floors.
2. **No down-time** waiting for adhesive to set. Operate units immediately.
3. **WESTSORB pads** furnished to your size specifications or in sheets which can be cut to size at time of installation.
4. **Reduce noise** and transmitted vibration.
5. **Increase efficiency** of machines—more and better production.
6. Resistant to oils, greases, solvents, etc.

Easier Installation... WITH Westsorb®

ADHESIVE-COATED FELT* MOUNTS

✣ Pre-applied on both sides. Peel off protective backing and Westsorb pad is ready for use (no cement necessary). Sticks firmly to any dry surface, will NOT SLIP. NO BOLTS needed.

Move your equipment when necessary – quickly – without drilling holes – with Westsorb felt mounts. They eliminate floor damage, prolong machine life, absorb vibration and reduce noise, saving many times their cost.

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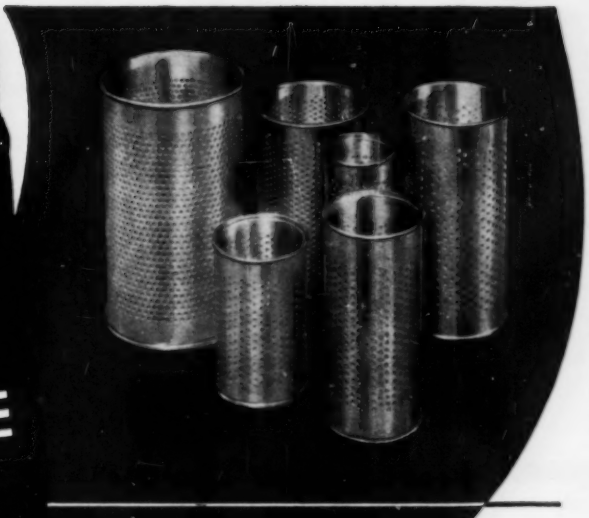

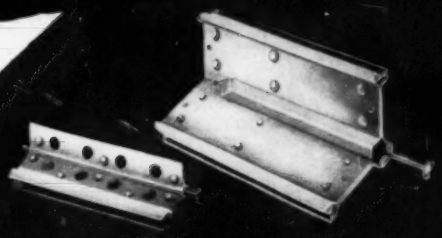

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Aluminum Stampings built to Your Specifications

A textile mill must have confidence in its source for expendable parts. That's why so many mill operators, for so many years, have specified us as suppliers of their custom-made aluminum stampings for mill maintenance.

These items, and others in this field, are typical of the custom built parts we are capable of supplying.

Please send us blueprints and details and let's get together on your needs.

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THE FINEST ALUMINUM

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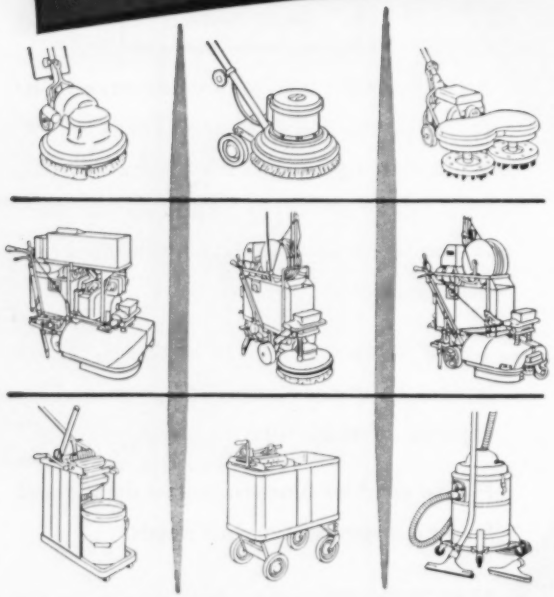
CIRCLE 189 ON READER SERVICE CARD 189

Keep your floor-maintenance men happy . . .

with *Job-Fitted* EQUIPMENT!

Choose from the COMPLETE *Finnell* Line

More than a score of models and sizes permits selection of the equipment that's exactly right for your job!



However much a maintenance man may want to do a good job, and at the same time show savings in labor costs, he's *stymied* if the machine is too small, or too large, or is otherwise unsuited to the job. Different floors and areas call for different care and equipment. That's why *Finnell makes more than a score of floor-maintenance machines.* From this complete line, it is possible to choose equipment that is correct in size as well as model . . . that provides the maximum brush coverage consistent with the area and arrangement of the floors.

Finnell offers *Conventional Polishing-Scrubbing Machines* in both concentrated and divided-weight types, each in a full range of sizes . . . a *Dry-Scrubber,* with self-sharpening brushes, for cleaning grease-caked floors . . . *Combination Scrubber-Vac Machines* for small, vast, and intermediate operations, including self-powered as well as electric models . . . *Mop Trucks* . . . a *Wet and Dry Vacuum Cleaner,* in baked enamel or stainless steel, with 1½ hp By-Pass Motor. In addition, *Finnell* offers a full line of fast-acting *Cleansers* for machine-scrubbing . . . *Sealers* and *Waxes* of every requisite type . . . *Steel-Wool Pads* and other accessories – *everything for floor care!*

In keeping with the *Finnell* policy of rendering an individualized service, *Finnell maintains a nation-wide staff of floor specialists and engineers. There's a Finnell man near you* to help solve your particular floor-maintenance problems . . . to train your operators in the proper use of *Finnell Job-Fitted Equipment and Supplies* . . . and to make periodic check-ups. For consultation, demonstration, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 1900 East Street, Elkhart, Indiana. Branch Offices in all principal cities of the United States and Canada.

FINNELL SYSTEM, INC.

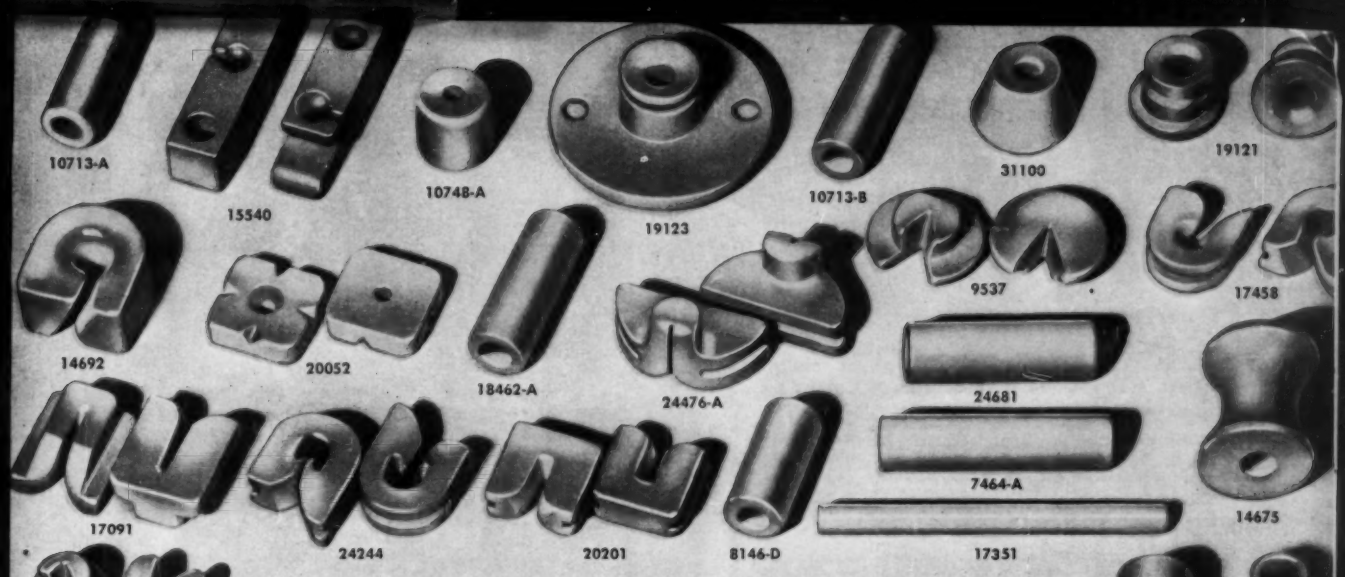
Originators of Power Scrubbing and Polishing Machines

Everything FINNELL for Floor Care

BRANCHES IN ALL PRINCIPAL CITIES

190 CIRCLE 190 ON READER SERVICE CARD

CIRCLE 191 ON READER SERVICE CARD→



Standard ALSIMAG® *guides*

in the **right material** for **your job!**

Here are a few of many standard AlSiMag guide designs ready for shipment

Advantages important to your mill are offered by AlSiMag:

Choice of Materials. A whole family of materials for the textile field, each with advantages for a particular application. Electrically conductive AlSiMag 193, for example, aids in the control of static.

Finer Quality. Homogeneous—no point of sudden failure. Smooth. Hard. Uniform. Dimensionally accurate. Help achieve more uniform tensions to improve product quality. Precision tolerances.

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TEST SAMPLES ON REQUEST.

SHOWN APPROX. ACTUAL SIZE

If you don't see the guides you need on this page, send us complete details. We can give you speedy service on custom designs. Custom samples for test can be produced promptly at reasonable cost. Write today.

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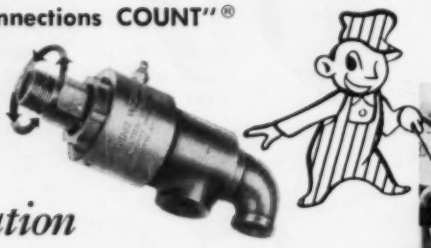
"WHERE Good Connections COUNT"®

A Perfect Combination

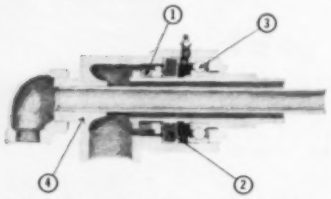


for accurate and economical control of steam on Slashers • Dry Cans • Embossers • Calenders • Printing and Finishing Equipment

You will be pleased by the long, leakproof, and trouble free service you get from this combination. It will save you money on steam and on maintenance and will reduce your parts and replacement inventories considerably.

THE ROTARY UNION*

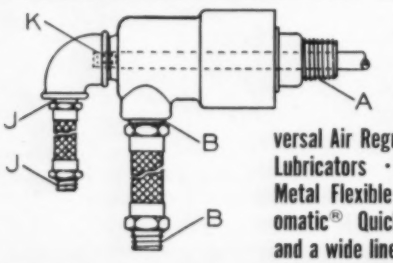
The ball bearing precision mechanical seal uses no springs or packings. The Rotary Union is self-adjusting to fluctuations in pressure, and automatically compensates for wear within the unit or for misalignment of machine adaptors. Perflex® Metal Hose Connections provide floating action, compensating for misalignment, shock, and strain. The Rotary Union requires no adjustments or mechanical maintenance of any kind and will outlast and outperform any other rotating steam joint.



Some Special Features

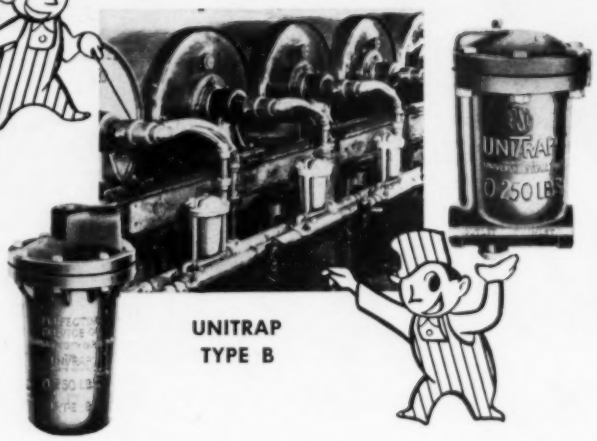
1. Heavy Monel Bellows automatically adjust to pressure. Keep sealing surfaces parallel and leakproof at all times.
2. Seal Ring . . . optically flat surface assures perfect seal.
3. Ball Bearing Construction. Precision, heavy-duty, radial thrust type. Minimizes friction and power consumption.
4. Unique Syphon Support prevents loosening, breaking or falling off of syphon pipe.

A	B	J	K	Recommended Hose Size & Min. Length J	Recommended Hose Size & Min. Length B
½	½	½	⅛	½ × 10	½ × 10
¾	¾	½	¼	½ × 10	¾ × 12
1	1	½	⅜	½ × 10	1 × 14
1¼	1¼	½	½	½ × 10	1¼ × 16
1½	1½	¾	¾	¾ × 12	1½ × 18
2	2	1	¾	1 × 14	2 × 21



Perfecting Service Company also makes: Universal Air Regulators, Filters, Lubricators • Perflex® All Metal Flexible Hose • Push-omatic® Quick Couplings • and a wide line of textile machinery specialties.

UNITRAP TYPE A



UNITRAP TYPE B

The UNITRAP* Universal Steam Trap

This is a new type bucket trap which automatically adjusts to all pressure variations from 0 to 250 lbs. without adjusting or changing of orifices, valves, or weights of buckets. Pipe size (½" through 2") is all you need specify when ordering. The UNITRAP assures tremendously increased capacity, less steam loss, less maintenance, and faster warm-up. Greatly simplifies traps and parts inventory.

TYPE A UNITRAP

Trap is designed for either straight in-line or angle installation. This model can be supplied with either a plug or blow-off valve at bottom. State which when ordering. Can be repaired without removing from steam line.

Trap No.	Pipe Size Connection	Operating Pressure Range P.S.I.	Capacity Lbs./Hr. Condensate
70-T	½	0-125	0- 1,000
170-T	½	0-125	0- 1,800
270-T	½	0-250	0- 3,500
370-T	¾	0-250	0- 4,500
470-T	1	0-250	0-10,000

TYPE B UNITRAP

Trap may be installed in vertical piping for in-line operation. It may also be installed in an angle or off-set position by removing plug in the angle connection and plugging the top outlet. All moving parts in both models are stainless steel.

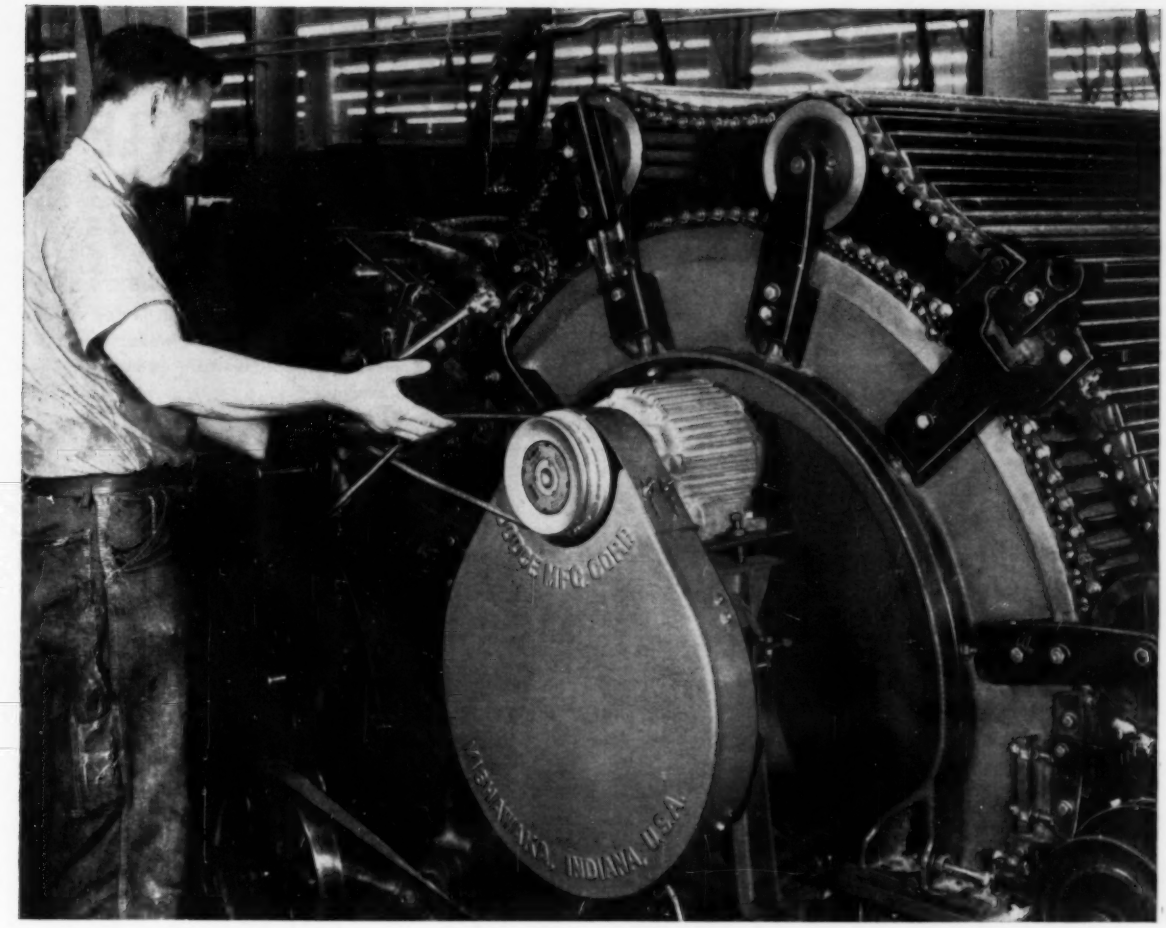
Trap No.	Pipe Size Connection	Operating Pressure Range P.S.I.	Capacity Lbs./Hr. Condensate
100-T	½	0-250	0- 3,000
200-T	½	0-250	0- 5,000
350-T	¾	0-250	0- 6,500
300-T	¾	0-250	0-10,000
450-T	1	0-250	0-13,000
400-T	1	0-250	0-20,000
500-T	1¼	0-250	0-30,000
600-T	1½-2	0-250	0-55,000

*Trade Name & Product Patented

PERFECTING SERVICE CO.

332 Atando Ave. (Home Office and Factory) Charlotte, N.C.

Baltimore—Buffalo—Camden, N. J.—Chicago—Cleveland—Los Angeles — New York—Providence—Hamilton, Ont.—Montreal—Toronto



INDIVIDUAL CARD DRIVE GIVES SOFT STARTS

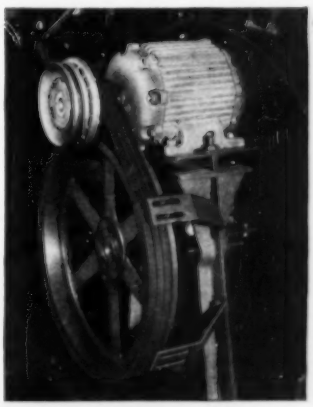
...ACCELERATES QUICKLY TO FULL SPEED

...AVOIDS EXCESSIVE STRAIN

Flexidyne, heart of this new complete Card Drive by Dodge, picks up the load smoothly... protects machinery and motor against shock and overload . . . delivers 100% efficiency during running cycle. Flexidyne, *the Dry Fluid Drive,* eliminates need for high torque motors and expensive controls, saves power, provides a new and better way to drive textile machines.

Note the special aluminum pulley mounted on Flexidyne housing, enabling quick, convenient operation of stripper. Pedestal has adjustable motor base to control tension on V-belts. You should have the full story of all the advantages of the new Dodge Flexidyne Card Drive. Ask your local Dodge Distributor, or write us, for new illustrated Bulletin A-653.

DODGE MANUFACTURING CORPORATION
1400 Union Street, Mishawaka, Indiana



DODGE
of Mishawaka, Ind.

CALL THE TRANSMISSIONEER—your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look in the *white* pages of your telephone directory for "Dodge Transmissioneer."

NEW! FLEXIDYNE CARD DRIVE

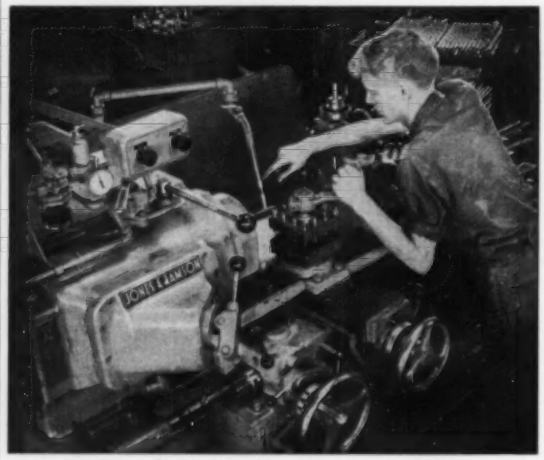
A complete package, ready to install.

- Flexidyne, keyed to motor shaft
- Pedestal, supporting motor
- V-flat drive
- Aluminum stripper pulley
- Aluminum guard

CIRCLE 193 ON READER SERVICE CARD 193

QUALITY WORKMANSHIP WITH PROMPT SERVICE

Our policy of two to three weeks delivery on all Roller, Flyer and Spindle repairs, is our Guaranteed Customer Service.



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A modern plant, fine equipment, experienced personnel and efficient management make it possible for us to guarantee complete satisfaction on:

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SATISFACTION GUARANTEED

194 CIRCLE 194 ON READER SERVICE CARD

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- **FREE SAMPLES OF SHUTTLE FUR**

All types of shuttle furs for textile mills in any width or grade. Also whole hides from Australia, Brown and Gray Opossum. Sheepskins, Yarn Pads, Hides and Strips also available.

- **WRITE TODAY FOR PRICES AND SAMPLES**

Shuttle glues, batteries and flashlights, all types of sheepskins, yarn pads, hides and strips, loompickers.

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  - BELT
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CIRCLE 291 ON READER SERVICE CARD

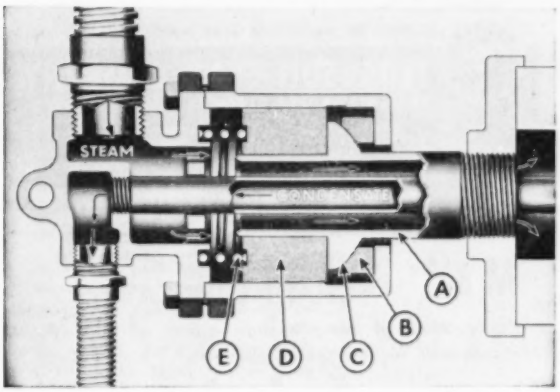
JOHNSON ROTARY PRESSURE JOINTS

For 23" Diameter Dry Cans, Print Cans, Calenders, 5' and 7' Cotton Slasher Cylinders, 30" Diameter Multiple Slasher Cylinders, Singer Rolls, and Compressive Shrinkage Ranges.

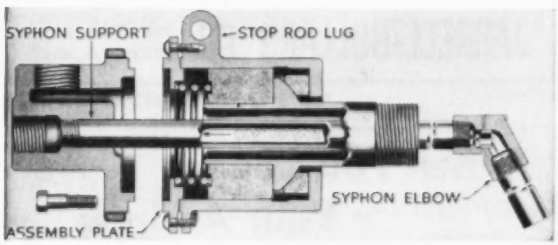
Johnson Joints are used throughout the textile industry to get steam into rotating rolls and to get condensate out again. They are completely packless, need no oiling or adjusting. Hundreds of thousands have been placed in service, and practically all machinery manufacturers have adopted them. Johnson Joints are available in types to meet all operating conditions, sizes from $\frac{1}{4}$ to 6" and for pressures up to 250 lbs.

Self-Supported – Type S

Type S Series 2000 Johnson Joints are self-supported. They are installed with flexible hose connections to permit them to shift wih the roll. Lugs are provided on body or head for stop rods. Cross section view below shows construction. Described in Bulletin S-2001.

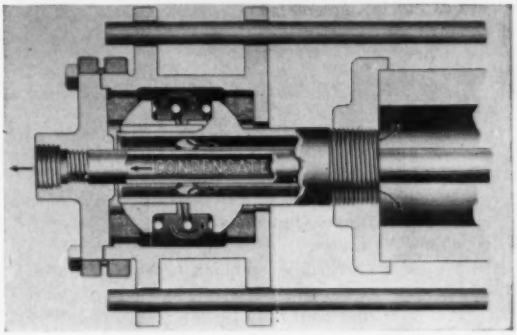


Type SB Johnson Joint. Rotating member consists of just one part, the nipple (A), attached to roll. Nipple has convex collar (B), which rotates against carbon graphite seal ring (C). Carbon graphite guide (D) is fitted carefully between nipple and body to support the joint. Spring (E) is used for initial seating only.

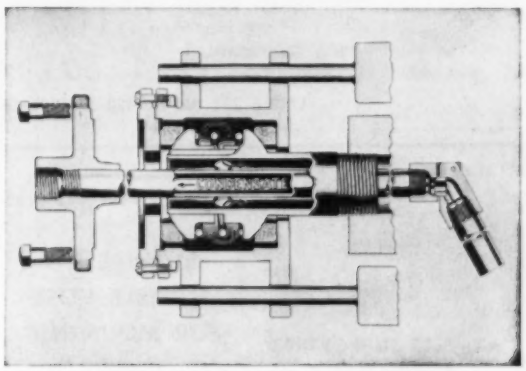


Type SB2P Series 3000 Johnson Joint with special assembly plate and Johnson Syphon Elbow. The assembly plate serves to hold internal parts in position when head is removed. It is a perfect team mate for the syphon elbow, since the syphon pipe can be withdrawn or inserted right through the Type SB2P.

Rod-Supported – Type L

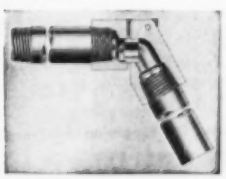


Type L. Johnson Joints have lugs cast on bodies which permit supporting the joints by simple rods. This arrangement lifts the weight of the body and the connecting fittings from the rotating assembly, and assures maximum life of the wearing parts. Cross section view shows construction of the Type L. Described in Bulletin J.



Type L-JSP Johnson Joint, as used with the Johnson Syphon Elbow. Joint has special assembly plate which serves to hold the internal parts in position when the head is removed. The syphon elbow and pipe can be inserted or withdrawn right through the joint.

Johnson Syphon Elbow



Designed for use with Johnson Joints, this mechanical syphon elbow eliminates many of the troubles encountered with unwieldy curved syphon pipes. It permits the use of two straight pipes for the syphon pipe. When inside the rotating roll, the weight of the pipe closes the elbow to a tight seal. The entire syphon pipe and elbow can be inserted or withdrawn right through the joint, in some cases while the machine is in operation. Described in Bulletin SE.

THE JOHNSON CORPORATION

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Low stretch . . .
High strength . . . .

SPINNING TAPES

LEADER WEBS

for top performance!

Smooth running, hard wearing S-W Cotton spinning and twister tapes are woven for rugged service. S-W heat-set Nylon and treated cotton spinning tapes have extremely low stretch factor.

All S-W spinning tapes and leader webs are put up in long lengths and are sold only by the yard—never by the pound. Try S-W quality on your next order for tapes, webbing or strapping.

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REQUIRE NO FLEXIBLE HOSE FOR MOUNTING

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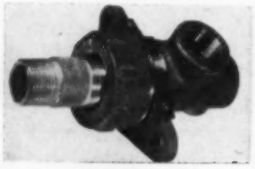
1. Lowest Turning Torque
2. Smallest Overall Dimensions
3. Carbon Seals Cannot Break
4. TEFLON Stationary Seal
5. Compensates For Roll Eccentricity
6. Syphon Pipe Will Not Weave Or Break
7. No Bearings
8. No Lubrication
9. No Flexible Hose (Optional)
10. Easily Repaired (Only Seven Parts)



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SIZES ½" TO 6" INC.

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M & J **AUTOMATIC CARD FLAT CHAIN LUBRICATOR**

Easily installed for thorough oiling of card flat chains with no lost production time.

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- **FAST**—Paints bobbins as fast as operator can feed.
- **SIMPLE OPERATION**—Small pump applies one drop of paint per bobbin to brush.
- **COMPACT**—Requires very little space.
- **ECONOMICAL**—Quickly pays for itself in paint saved.
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Protect your plant from thieves and vandals

with USS Cyclone Fence

THE weaving of fabrics and materials is your main business, but here's another weave that should be your concern, too. It's Cyclone woven Chain Link Fabric and it's used to make Cyclone Fence—the most widely used property protection fence in the world.

Cyclone Fence is especially designed for use around all types of manufacturing plants—to discourage vandals, keep out thoughtless trespassers and simplify the regulation of entrance and exit traffic at authorized gates. Cyclone Fence is available in several different heights, with or without barbed wire toppings, to meet your individual requirements. Our experienced engineers wil be happy to give you free advice.

You can buy cheaper fence than Cyclone, but it will cost you more in the long run. Cyclone gives full value for your dollar. Nothing but brand-new, top-quality material is used throughout. Posts and top rails are heavy and rigid. Gates won't drag. The chain link fabric is woven from heavy steel wire, galvanized *after* weaving. And Cyclone Fence is erected by full-time well-trained experts —so that it will stay trim and good-looking for years. Write us for more complete information and literature on all types of Cyclone Fence.

USS and Cyclone are registered trademarks

Cyclone Fence... special features

Concrete Footing All Cyclone line, gate and corner posts are firmly set in deep, heavy bases of concrete

Gate Hinge Cyclone Gates swing open and closed freely, easily, without sagging on the Cyclone ball and socket hinge.

Key-Locked Barbed Wire Barbed Wire is locked into notches in extension arm by key inserted at the end. The wire is free to slip through these notches to compensate for expansion and contraction.

12M Galvanizing After weaving, where extra corrosion resistance is necessary, Cyclone Chain Link Fabric is given an extra-heavy zinc coating that enables it to undergo 12 one-minute immersions in a copper sulphate solution, duplicating many years of tough service.

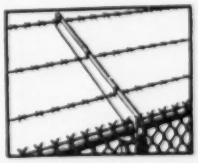
No job is too large—No job is too small for Cyclone

Cyclone Fence Dept.
American Steel & Wire Division of USS **United States Steel**

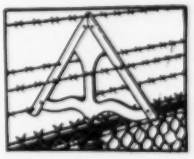
Waukegan, Ill. - Sales Offices Coast-to-Coast - United States Steel Export Company, Distributors Abroad

Cyclone Fence
. . . available in a variety of styles

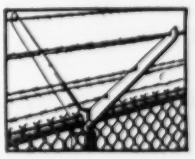
Cyclone Safeguard Fence is designed for use where a neat, good-looking fence is desired, but where the maximum amount of protection is not needed.



Cyclone Invincible Fence —topped with three strands of barbed wire on a strong extension arm—assures a greater degree of trespasser exclusion.



Cyclone Non-Climbable Fence has 5 strands of barbed wire on A-shaped arms. As its name implies, this fence is virtually impossible to climb.



Cyclone Victory Fence is very much like the Non-Climbable Fence except that the arms are reversed and carry 6 strands of barbed wire.

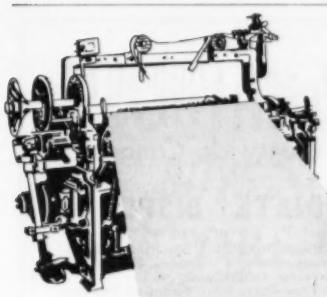
SEARCHLIGHT ADVERTISERS' INDEX
1959-1960 TEXTILE WORLD FACT FILE ISSUE

Classifications of the products or services offered by the SEARCHLIGHT advertisers in this issue.

1 Aftercoolers
2 Auctioneers & Appraisers
3 Boarding Machines
4 Calenders
5 Card Equipment
6 Combing Equipment
7 Compressors
8 Drawing & Doubling Equipment
9 Dryers & Ovens
10 Dyeing Equipment
11 Dyestuffs
12 Extractors
13 Frames, Roving
14 Frames, Spinning
15 Frames, Tenter
16 Garnetters
17 Inspecting Machines
18 Knitting Machines
19 Looms, Accessories
20 Mangles
21 Mixing Equipment
22 Nappers
23 Opening & Picking Equipment
24 Printing Machines
25 Shearers
26 Sewing Machines
27 Testing & Measuring Equipment
28 Twisters
29 Vacuum Pumps
30 Vats & Kettles
31 Warpers
32 Washers
33 Winders

The numbers after advertiser's name, indicate the products or services offered by the advertiser.

ADVERTISER	PAGE NO.	KEY NUMBERS TO PRODUCTS OR SERVICES *See Classifications Above*
American Air Compressor Corp.	205	1, 7, 29
Central Mills Supply Corp.	200	2, 3, 4, 6, 7, 8, 9, 10, 12, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33
Chavis Textile Sales Co.	204	33
Cornell Sales	202	27
Crescent Corporation 1958	202	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33
Fitzgerald, James E.	200	4, 10, 15, 24
Freeman Co., Samuel T.	204	2
Interstate Textile Equipment Co.	205	2, 10, 14, 18, 23
Lewis, J. Laurence	203	2, 5, 9, 10, 12, 14, 16, 19, 22, 23
Machinery Sales Corp.	204	2, 5, 6, 7, 8, 10, 12, 13, 14, 16, 17, 19, 21, 22, 23, 25, 27, 28, 30, 31, 33
Pennsylvania Spool & Equipment Co.	200	10, 12, 17, 19, 27, 28, 31, 33
Rabinowitz & Sons, William	204	2, 7, 10, 12, 17, 19, 25, 27, 28, 31, 33
Republic Textile Equipment Co.	199	4, 5, 6, 8, 9, 10, 12, 13, 14, 15, 17, 19, 20, 22, 23, 24, 25, 26, 27, 28, 30, 31, 32, 33
Southern Bobbin Works	204	19
Southern Mill Supply	201	5, 6, 8, 10, 13, 14, 23, 31, 33
Southern Textile Works	203	15
Standard Mill Supply	205	17, 19, 27, 33
Textile Auxiliaries Inc.	204	4, 10, 15, 24
Thackston & Redding, Inc.	205	1, 2, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 16, 17, 19, 20, 22, 23, 24, 25, 26, 27, 28, 31, 32, 33
Twindustries, Inc.	203	5, 7, 9, 13, 14, 15, 17, 19, 20, 22, 23, 28, 31, 33
United Textile Machinery Corp.	206	10, 15, 19, 20, 21, 24, 27, 30, 31, 32, 33
Wheeler Co., Frank W.	200	5, 9, 10, 12, 14, 15, 16, 17, 19, 22, 23, 25, 28, 31, 32, 33,



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3—Whitin Model N-3 Blending Feeders, totally enclosed, 36" wide, M.D., 1949.
3—Aldrich 40", 3-beater Single Process Pickers, M.D., 1950.
1—40" Saco-Lowell Breaker Picker, M.D.
1—42" Lummus Super-jet Cleaner, 1952.
1—Centrif-Air Superior Cleaner, M.D.
1—Lummus Gyrator, M.D.
5—American Air Filters, Model A, 1953.
1—40" Aldrich #7 Opener, 1950.
1—Saco-Lowell Vertical Opener, M.D.
1—Aldrich Conveyor 16" x 45' long, 1952.
2—36" Aldrich Ceiling Condensers, equipped with Blowers, M.D.
2—42" Saco-Lowell Kitson F-5 Hopper Feeders, B.D.
1—38½" Saco-Lowell F-5 Hopper Feeder, B.D.
4—34½" F-5 Hopper Feeders, equipped with Sargent Rakes.
1—Eriez dual Magnetic Separator.
1—Saco-Lowell Model 4, Lap Meter, 1951.
46—Whitin 40" R.F. Cotton Cards, Model H, 27" doffers, 14" coilers, Abington strippers, 5 point setting, B.D.
20—Platt 40" R.F. Cotton Cards, 27" doffers, 14" coilers, Abington strippers, B.D.
4—Whitin 40" R.F. Waste Cards, Model H, equipped with Bramwell Feeders, metallic breasts, 2—12" coilers, 1940.
1—Abington Vacuum Card Stripping System—set up for 66 Cards.
40—Deliveries—Whitin Bi-coil Drawing, 1953.
3—Whitin 12 x 6 Slubbers, 72 spdls. each, 10" gauge, equipped with Whitin long draft. Individually M.D. Long Draft added 1958.
2—Saco-Pettee 12 x 6 Slubbers, 68 spdls. each, 10¼" gauge, individually M.D.
1—H & B English 12 x 6 Slubber, 72 spdls., 9½" gauge, M.D.
2—H & B American 11 x 5½ Slubbers, 86 spdls. ea., 9½" gauge, individually M.D.
2—Saco-Lowell 10 x 5, Model J-3 Slubbers, 108 spdls. ea., 8" gauge, individually M.D., 1946.
4—Whitin 10 x 5 Slubbers, 96 spdls. ea., 7½" gauge, individually M.D.
2—Whitin, Model J-5 Combers, 8 heads each, 14" coilers, one-shot lubrication. Serial Nos. 580026, 580027. Individually M.D. 1958.
1—Saco-Lowell Lap Winder, Model 37, 8¾", 16 end back, 1947.
18—Whitin Model F-2 Superdraft Ring Spinning Frames, Tape Drive, 264 spdls. ea., 3½" gauge, 2¼" rings, 8" traverse, one-shot lubrication, individually M.D. Equipped with Parks-Cramer Turbo Overhead Cleaners. (7 Frames—1941; 2 Frames—1949; 9 Frames—1950).
5—D & B Tape Drive Ring Spinning Frames, 204 spdls. each, 4" gauge, 2½" rings, 8" traverse, individually M.D.
8—D & B Tape Drive Ring Spinning Frames, 156 spdls. each, 4½" gauge, 3" rings.
3—Saco-Lowell Tape Drive Ring Twisters, 5½" gauge, 3½" rings, 120 spdls.
1—Sydel Woolley Twist Setter, M.D.
2—Universal #44 Roto-Coners, 120 spdls. each, 6" traverse, bakelite drums, 9"—36 min. paper cones, waxing attachments, M.D.
3—Abbott Model 65 automatic Cone Winders, 100 spdls. each, 6" traverse (1 for paper cones 9"—36 Min.; 2 for wooden cones), individually M.D.
1—Abbott Model 65 automatic Cone Winder, 84 spdls., 6" traverse, for wooden cones, M.D.
2—Universal Model 45 Jumbo Cone Winders, 5 spdls. each, 10" traverse, M.D.
8—Universal Model 50 Cone Winders, 6" traverse, wash-board tensions, M.D.
1—Tatham's Thread Extractor, equipped with condenser, blower, and conveyor, M.D., 1948.
1—Saco-Lowell Willow—main cylinder 48" dia., 56" face, B.D.
1—Climax All Steel Waste Baling Press, downstroke type, M.D., 1952.
1—Armstrong Cork Cot Buffing Machine, Ser. #B-1633, M.D.
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4—Whitin Staple Cutters.
1—Toledo Dormant Floor Scale, 1600# cap.
5—Crimping Machines.
1—Parsons 64-Bag Dust Collector.
1—Economy Upstroke Waste Baling Press. I.M. 44" W x 24" D x 53" H. M.D.
5—Rodney Hunt Wring-Masters, 20" face, 12" dia. Pneumatic, Reeves, M.D.
5—Rodney Hunt Washers, 90" squeeze rolls, 16" dia. Pneumatic, Reeves, M.D.
1—Aluminum Peroxide Tank, 5000 gal. cap., Pump, Level Meter.
1—Sample Worsted Spinning Unit
2—Weisner - Rapp Stainless Steel "J" Boxes with controls and drives.
4—Shriver Filter Presses, Size 24.
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4—Universal #44 Roto Coners equipped for 1⅝" dye tubes, wood cones or Franklin springs.
20—Atwood #110 Uptwisters, 184 spindles each, Headless Package.
1—Barber-Colman Super Hi-Speed Warper, 54" wide, Model 532 VW, year 1947, with 540 end Creel, Model VC-555, 900 yards per minute, M.D.
10—Roberts Co. Spinning Frames, 240 spindles each, High Draft, Model 55R, 4" ga. 9" traverse, Tape Drive, Aero Creel, year 1956-57, M.D.

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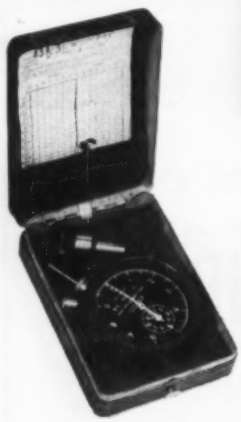

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3—Saco-Lowell 180 Spindle Tape Driven Twisters 4½" gauge, 3" rings. M.D.
30—40" Saco-Lowell R.F. Cotton Cards, 27" doffers, Abington strippers, 110 flats, spindle backs. 1914 models. B.D.
70—40" Saco & Pettee R.F. Cotton Cards, 27" doffers, Abington strippers, 110 flats, spindle backs. B.D.
5—Saco-Lowell Model 34 Air Filters and Dust Collectors, 1951 Models.
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76—Draper Model E 1x1 Box Automatic Looms. 59¼" reed space, 54" cloth roller and spring tops. 220/3/60 motors.
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6—40" Saco-Lowell 2 Section Single Process Pickers. M.D.
2—Saco-Lowell W3 Double Cylinder Waste Machines. M. D.
120—Deliveries of Saco-Lowell and Saco Pettee conventional Drawing. (6 and 4 head units).
5—Saco-Lowell 10x5 Intermediate Roving Frames, 84 sp. each, 7⅛" x 7" gauge. B.D.
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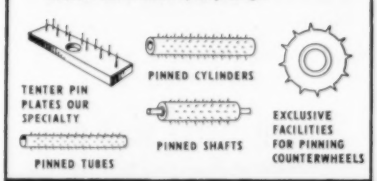

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24—C&K W3 Looms, 82", 4 x 1 Auto.
24—C&K W3 Looms, 80", 4 x 1 Auto.
14—SS Piece Dye Kettles, 5', 6', 8' wide
1—Foster #102 Winder, 1952, 40 sp. 6" traverse
2—92" Pinless Dressing Reels, w/compressors
1—Universal #6C Winder, 6 sp. 8" x 8" package
3—Foster #77 Winder, 6 sp. each
4—#45 Universal Winders, 10 x 10 pkg., 5 sp.
1—#2 Watson 3-strand Former and Layer
30—Haskell Dawes 2 sp. Twisters, 8 x 10, 12 x 14, 12 x 22
4—6 sp. 8 x 10 Haskell Dawes Twisters
3—12 sp. 5 x 7 Haskell Dawes Twisters
6—Balling Machines for Twine, gear driven
1—54" Logemann Waste Baling Press
1—70" face Gessner Squeeze Roll, pneumatic, 1948
1—500 lb. SS R&L Raw Stock Dye Kettle
1—New DeLaval SS Separator, Model AA70
1—5-color RB&F 45" Print Machine
1—Butterworth 66" Micro-set Padder
1—66" Meadows double knife Coater
1—Butterworth 66" single color Print Machine, pneumatic
1—168" SS Werner Dye Jigg
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CLEVELAND, 13—1164 Illuminating Bldg. SUperior 1-7000
W. B. SULLIVAN—T. H. HUNTER

DALLAS, 1—1712 Commerce St., Vaughan Bldg. RIverside 7-5117
GORDON JONES—F. E. HOLLAND

DETROIT, 26—856 Penobscot Bldg. WOodward 2-1793
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CIRCLE KEY NO. BELOW ON POST CARD FOR LITERATURE, BOOKLETS AND TECHNICAL BULLETINS AVAILABLE FROM THE FOLLOWING ADVERTISERS IN THIS ISSUE:

KEY NO. PAGE

181 **ALEMITE DIV.** 181
Lubricating Pumps — For details write for new "77" Pump Catalog.

289 **BABBITT STEAM SPECIALTY CO.** 186
Overhead Valve Sprocket Rim —Write for descriptive Catalog Sheet.

72 **BAHNSON CO.** 72
For Air at Work—write for our Bulletins 22A-30A-21A.

182 **BASSICK CO., THE**..... 182
Casters—For complete data on Textile Casters write for Textile Bulletin #Tex-125-58.

91 **BOOTH CO., BENJAMIN**..... 91
Card Clothing — Send for descriptive folder.

63 **CONTINENTAL-DIAMOND FIBRE** .....63 & 63
Write for Receptacles Catalog —showing complete line.

75 **CURLATOR CORP.** 75
Write for bulletin for detailed information on fibers used, webs made.

80 **CUSTOM SCIENTIFIC INSTRUMENTS, INC.** 80
For Production, Quality Control & Research Testers write for our Catalog.

197 **CYCLONE FENCE DEPT**..... 197
Cyclone Fence—For complete information write for literature.

193 **DODGE MFG. CORP**..... 193
Flexidyne Card Drive—For full details write for illustrated Bulletin A-653.

282 **EMKAY CHEMICAL CO**..... 158
Chemicals for Textile Processing—Send for Technical Data Sheet No. 166.

190 **FINNELL SYSTEM, INC**..... 190
Floor Maintenance—Write for literature describing floor maintenance equipment.

277 **GUIDER SPECIALTY CO**..... 140
Air Guiders—Write for copy of Air Guider Catalog.

CONTINUED ON NEXT PAGE

ADVERTISEMENTS:			INSIDE FRONT COVER				INSIDE BACK COVER					BACK COVER	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
15	16	17	18	19	20	21	22	23	24	25	26	27	28
29	30	31	32	33	34	35	36	37	38	39	40	41	42
43	44	45	46	47	48	49	50	51	52	53	54	55	56
57	58	59	60	61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80	81	82	83	84
85	86	87	88	89	90	91	92	93	94	95	96	97	98
99	100	101	102	103	104	105	106	107	108	109	110	111	112
113	114	115	116	117	118	119	120	121	122	123	124	125	126
127	128	129	130	131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150	151	152	153	154
155	156	157	158	159	160	161	162	163	164	165	166	167	168
169	170	171	172	173	174	175	176	177	178	179	180	181	182
183	184	185	186	187	188	189	190	191	192	193	194	195	196
197	198	199	200	201	202	203	204	205	206	207	208	209	210
211	212	213	214	215	216	217	218	219	220	221	222	223	224
225	226	227	228	229	230	231	232	233	234	235	236	237	238
239	240	241	242	243	244	245	246	247	248	249	250		
251	252	253	254	255	256	257	258	259	260	261	262	263	264
265	266	267	268	269	270	271	272	273	274	275	276	277	278
279	280	281	282	283	284	285	286	287	288	289	290	291	292
293	294	295	296	297	298	299	300						

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Mill .....

Street .....

City ..... State .....

TEXTILE WORLD, A McGraw-Hill Publication, New York 36, N. Y. Fact File, 1959

ADVERTISEMENTS:			INSIDE FRONT COVER				INSIDE BACK COVER					BACK COVER	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
15	16	17	18	19	20	21	22	23	24	25	26	27	28
29	30	31	32	33	34	35	36	37	38	39	40	41	42
43	44	45	46	47	48	49	50	51	52	53	54	55	56
57	58	59	60	61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80	81	82	83	84
85	86	87	88	89	90	91	92	93	94	95	96	97	98
99	100	101	102	103	104	105	106	107	108	109	110	111	112
113	114	115	116	117	118	119	120	121	122	123	124	125	126
127	128	129	130	131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150	151	152	153	154
155	156	157	158	159	160	161	162	163	164	165	166	167	168
169	170	171	172	173	174	175	176	177	178	179	180	181	182
183	184	185	186	187	188	189	190	191	192	193	194	195	196
197	198	199	200	201	202	203	204	205	206	207	208	209	210
211	212	213	214	215	216	217	218	219	220	221	222	223	224
225	226	227	228	229	230	231	232	233	234	235	236	237	238
239	240	241	242	243	244	245	246	247	248	249	250		
251	252	253	254	255	256	257	258	259	260	261	262	263	264
265	266	267	268	269	270	271	272	273	274	275	276	277	278
279	280	281	282	283	284	285	286	287	288	289	290	291	292
293	294	295	296	297	298	299	300						

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Name .....Title .....

Mill .....

Street .....

City ..... State .....

TEXTILE WORLD, A McGraw-Hill Publication, New York 36, N. Y. Fact File, 1959

KEY NO. PAGE

153 **HUNT MACHINE CO., RODNEY** 153
For Wet Finishing Machinery information—Write for Bulletin 54—Catalog 849—Catalog TM 89.

76 **INDUSTRIAL DRYER CORP.** 76
For complete information on our products,—Write for Bulletin U.C.

195 **JOHNSON CORP., THE** 195
Rotary Joints — For details write for Bulletin S-2001, Bulletin J, Bulletin SE.

127 **KLAUDER WELDON GILES MACHINE CO.** 127
Paddle Wheel Dyeing Machine Write us for Bulletin describing this machine.

134 **THE LANLY CO.** 134
Write for Catalog 570-T for information on Textile Dryers & Ovens.

185 **LINCOLN ENGINEERING CO.** 185
Lubrication Systems — Write for Illustrated 16 page brochure "A Report to Management"

88 **LIVINGSTON & HAVEN, INC.** 88
For complete details on Pneumatic Lap Control System—Write for our illustrated brochure.

161 **MIXING EQUIPMENT CO., INC.** 161
Mixers—For helpful facts on mixing, plus description of mixers, send for Catalogs B-102, B-103, B-104, B-107, B-108, B-109, B-112.

70 **NATIONAL VULCANIZED FIBRE CO.** 70
Write to Dept. BB-7 for our Comprehensive booklet.

164 **NEW DEPARTURE DIV. GENERAL MOTORS** 164
Textile Ball-Bearings — Write for full information and Catalog Tex-1.

284 **PABST BREWING CO.** 158
Desize—Write for literature and Samples.

101 **REINER INC., ROBERT** 101
For details on Warp Knitting, Full Fashioned, Weaving & Finishing and Embroidery equipment—Write for our illustrated Catalogs.

156-157 **RIGGS & LOMBARD, INC.** 156-157
Write for Catalog Sheets briefly describing all of our Finishing Equipment.

196 **ROTHERM ENGINEERING CO., INC.** 196
Expansion Joints—For details write for Expansion Joint Catalog.

96 **ROY & SON CO., B. S.** 96
For balanced card grinders—Write us for complete details.

66 **SACO LOWELL SHOPS** 66
Send for complete Catalog about our machines.

89 **SCOTT TESTERS, INC.** 89
For details on Tensile Testers—Write for Brochure "CRE" and for Automatic Testers, write for Brochure "Scotamatic."

183 **STEPHENS-ADAMSON MFG. CO.** 183
Ball Bearings — For details write for Catalog 454.

14 **TAYLOR CO., THE HALSY W.** 14
For water coolers and fountains—Write for our latest Catalog.

131 **THILMANY PULP & PAPER CO.** 131
Write for free sample kit containing grades of Textile Wraps.

188 **WESTERN FELT WORKS** 188
Felt Mounting Pads—Write for Westsorb sample and descriptive folder.

136 **WIEGAND CO., EDWIN L.** 136
For information about Chromalax Electric Far-infrared Heat. Write for new Catalog G-1004.

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INDEX TO PRODUCTS AND SERVICES ADVERTISED

Machinery, equipment, chemicals, dyestuffs, other supplies and services advertised in this issue are listed alphabetically on the following pages, together with the names of companies supplying them to the textile industry. Alphabetical list of these companies with their addresses and advertising page numbers follows directly behind this section.

In general, products and services are listed according to their noun, with descriptive word or words following, i.e.: DRIVES—Hydraulic. If a product is peculiar to the textile industry, it is listed under the word or words that represent the accepted terminology of the industry, i.e.: ROVING FRAMES. Wherever necessary, cross references are provided to facilitate convenient use of these listings.

ABSORBENT-COTTON PROCESSING MACHINES
Allen Son's Co., Wm., Div., O. G. Kelly & Co.
Curlator Corp.
Harwood & Son, Geo. S.
Hunter Machine Co., James
Proctor & Schwartz, Inc.

ACETATE DYES (See Dyes-Acetate)

ACETATE SIZINGS (See Sizing Agents)

ACETATE (Cellulose Esters) Yarns & Fibers (See Yarns & Fibers)

ACETATES (See under individual headings: Aluminum—Salts of Acetate, etc.)

ACETIC ACID (See Acids)

ACID COLORS & DYES (See Dyes)

ACIDS
Acetic ..... **A**
Acetic, Glacial ..... **B**
Fluoboric ..... **C**
Hydrochloric ..... **D**
Hydrofluoric ..... **E**
Lactic ..... **F**
Nitric ..... **G**
Oxalic ..... **H**
Phosphoric ..... **I**
Sulfuric ..... **J**
Sulfurous ..... **K**
Tannic ..... **L**
Clinton Corn Processing Co. ..... F
General Chemical Div., Allied Chemical Corp. A, B, C, D, E, G, H, I, J
Harshaw Chemical Co. ..... C, E, L
Tennessee Corp. ..... J, K

ACRYLIC YARNS & FIBERS (See Yarns & Fibers)

ADAPTERS
Cone ..... **A**
Spindle ..... **B**
Cocker Machine & Foundry Co. ..... A, B
Engineered Plastics, Inc. ..... A, B
Parks Co., M. H. ..... A

ADHESIVES
du Pont de Nemours & Co., Inc., E. I., Electrochemicals Dept.
Emkay Chemical Co.
General Chemical Div., Allied Chemical Corp.
Mortex Chemical Products, Inc.
Polymer Industries
Swift & Co., Adhesive Products Dept.

AGERS
Butterworth & Sons, Co., H. W.
Hunt Machine Co., Rodney
McKiernan-Terry Corp., Textile Machinery Div.
Riggs & Lombard Co.

AGITATORS (See Mixers—Mechanical)

AIR COMPRESSORS
Livingston & Haven, Inc.

AIR CONDITIONERS (See also Humidifiers—Room)
Central Refrigeration and Air-Washer Types ..... **A**
Unit Type ..... **B**
Bahnson Co. ..... A, B
Humiduct—See Bahnson Co.

ALUM (See Aluminum—Salts of—Potassium Sulfate)

ALUMINUM—*Salts of*
Chloride ..... **A**
Fluoride ..... **B**
Potassium Sulfate (Alum) ..... **C**
Stearate ..... **D**
Sulfate ..... **E**
General Chemical Div., Allied Chemical Corp. A, B, C, E
Harshaw Chemical Co. ..... D

AMMONIA (See Ammonium—Salts of—Hydroxide)

AMMONIUM—*Salts of*
Acetate ..... **A**
Carbonate ..... **B**
Chloride ..... **C**
Hydroxide (Ammonia) ..... **D**
Hydroxide (Tetra Substituted) ..... **E**
Persulfate ..... **F**
Silicofluoride ..... **G**
Sulfocyanide ..... **H**
Tartrate ..... **I**
Vanadate ..... **J**
General Chemical Div., Allied Chemical Corp. ..... D
Harshaw Chemical Co. ..... A, B, C, D, E, F, G, H, I, J

ANTICHLORS
General Chemical Div., Allied Chemical Corp.
Tennessee Corp.

ANTICREASING AGENTS (See Crease-Proofing Compounds)

ANTICROCKING AGENTS
Emkay Chemical Co.
Moretex Chemical Products, Inc.
Polymer Industries

ANTIFELTING AGENTS
Emkay Chemical Co.
Moretex Chemical Products, Inc.

ANTIFOAMING AGENTS
Emkay Chemical Co.
Moretex Chemical Products, Inc.
Siddall Co., Inc., Geo. F.

ANTIMONY CHLORIDE (See Mordants)

ANTIMONY FLUORIDE (See Mordants)

ANTIMONY LACTATE (See Mordants)

ANTIMONY OXIDE (See Mordants)

ANTIMONY POTASSIUM TARTRATE (See Mordants)

ANTIMONY SALT (See Mordants)

ANTIOXIDANTS
Oil & Fat ..... **A**
Vat Dye ..... **B**
Emkay Chemical Co. ..... A, B

ANTISEPTICS
Emkay Chemical Co.

ANTI-SLIP COMPOUNDS
Emkay Chemical Co.
Moretex Chemical Products, Inc.

ANTI-STATIC AGENTS
Emkay Chemical Co.
Moretex Chemical Products, Inc.
Textile Adjuncts Corp.

APPRAISERS—*Plant* (See Engineering Services)

APRONS
Apparel (See Gloves & Aprons)
Canvas ..... **A**
Comb (See Aprons—Gill Box)
Condenser (See Aprons—Rub)
Decating ..... **B**
Feed ..... **C**
Gill Box, Comb & Converter ..... **D**
Long Draft ..... **E**
Picker (See Aprons—Feed)
Rub ..... **F**
Slat (See Aprons—Feed)
Spinning (See Aprons—Long Draft)
Strip (See Aprons—Feed)
Davis & Furber Machine Co. ..... F
Dixon Corp. ..... E
Gessner Co., David ..... B
Harwood & Son, Geo. S. C
Hay Co., Inc., James E. ..... C, D, E, F
Saco-Lowell Shops ..... C, E, F
Sargent's Sons Corp., C. G. ..... A, C

FOR ADVERTISING PAGE NUMBERS AND ADDRESSES SEE PG. 223

ASBESTOS-PROCESSING MACHINES
Curlator Corp.
Harwood & Son, Geo. S.

ATOMIZERS—*Humidifying* (See Humidifiers—Room, Nozzles—Spray)

AUTOSTATERS (See Controls—Automatic & Manual Motor)

AZO DYES (See Dyes—Naphthol)

AZOIC DYES (See Dyes—Naphthol)

BACK-DRYERS
Andrews & Goodrich Div. of Midland-Ross Corp.
Butterworth & Sons Co., H. W.
Carroll & Co., J. E.
Lanly Co.
Textile Shops

BACK-FILLING MACHINES
Birch Bros., Inc.
Butterworth & Sons Co., H. W.
Textile Shops

BACK-GRAY (See Cloth—Mechanical)

BACK-WASHING MACHINES
Sargent's Sons Corp., C. G.

BACK-WINDERS
Birch Bros., Inc.
Foster Machine Co.
Universal Winding Co.

BACTERICIDES (See Mildew Preventives)

BAGGING MACHINES
Sargent's Sons Corp., C. G.

BALING PRESSES
Logemann Bros. Co.
Sargent's Sons Corp., C. G.

BALLING HEADS
Proctor & Schwartz, Inc.
Societe Alsacienne de Constructions Mechaniques, Mulhouse, France—Rep. in U.S.A. by Atkinson, Haserick & Co.

BALL WINDING MACHINES (See Winders—Ball)

BALLING MACHINES (See Warpers—Ball)

BANDING MACHINES
Acme Steel Co.

BANDS—*Box Strapping* (See Strapping—Box & Carton)

BANDS
Hosiery (Paper) ..... **A**
Mule, Spinning & Twisting ..... **B**
Booth Co., Benjamin ..... B

BANDS—*Strapping* (See Strapping—Box & Carton)

BANDS—*Tie* (See Strapping—Box & Carton)

BANKERS (See Factors—Textile)

BARIUM—*Salts of*
Carbonate ..... **A**
Chloride ..... **B**
Peroxide ..... **C**
Harshaw Chemical Co. ..... A, B, C

BARRELS—*Beam*
Continental Diamond Fibre Corp.
Sonoco Products Co.
National Vulcanized Fibre Co., Kennett Div.

BARS—*Dobby* (See Lags—Picker)

BASIC DYES (See Dyes)

BASKETS
Canvas ..... **A**
Fibre (See also Boxes—Fibre & Wood) ..... **B**
Perforated Metal ..... **C**
Wire ..... **D**
Batson Co., Louis P. ..... A, B, C
Continental Diamond Fibre Corp. ..... B
Excel Co., Inc. ..... A, B, C, D
Fisher Mfg. Co. ..... B, C
National Vulcanized Fibre Co. ..... B

BAST FIBER PROCESSING MACHINE (See Cordage Machines)
Curlator Corp.
Societe Alsacienne de Constructions Mechaniques, Mulhouse, France—Rep. in U.S.A. by Atkinson, Haserick & Co.

BATCHERS (See Winders—Cloth)

BATT-MAKING MACHINES
Curlator Corp.
Proctor & Schwartz, Inc.

BATTING MACHINES (See Pickers—Cotton)

BEAM-DYEING MACHINES (See Dyeing Machines—Warp)

BEAM BARRELS (See Barrels—Beam)

BEAM STORAGE RACKS
Batson Co., Louis P.
Cocker Machinery & Foundry Co.
Excel Co., Inc.
Fisher Mfg. Co.
Textile Shops

BEAMERS (See Warpers—Beam)

BEAM & BEAM HEADS—*Dye*
Turbo Machine Co. ..... B

BEARINGS
Babbitted ..... **A**
Ball ..... **B**
Brass or Bronze ..... **C**
Nylon ..... **D**
Oilless or Self-Lubricating ..... **E**
Roller ..... **F**
Sleeve ..... **G**
Synthetic Composition ..... **H**
Thrust ..... **I**
Dixon Corp. ..... H
Dodge Mfg. Corp. ..... A, B, C, E, F, G, I
Engineered Plastics, Inc. ..... D, H
Hess-Bright—See SKF Industries
Tyson Reed—See SKF Industries
Livingston & Haven, Inc. ..... F
New Departure Div., General Motors Corp. ..... B, E
B. F. Perkins & Son Inc. ..... A
Rulon—See Dixon Corp.
SKF Industries Inc. ..... B, F
Stephens-Adamson Mfg. Co. ..... A, B, E

BECK DYEING MACHINES (See Dyeing Machines—Piece Goods & Reel)

BELT ACCESSORIES (Cements, Dressings, etc.)
Batson Co., Louis P.
Hay Co., Inc., James E.

BELT—CHAIN (See Chains—Conveyor & Elevator, Power Transmission)

BELTS
Leather ..... **A**
V- ..... **B**
Dodge Mfg. Corp. ..... B
Hay Co., Inc., James E. ..... A

BICHLORIDE OF TIN (See Tin—Salts of—Chloride)

BINDERS—Chemical
du pont de Nemours & Co., Inc., E. I., Electrochemicals Dept.
Emkay Chemical Co.
Moretex Chemical Products, Inc.
Polymer Industries
Rohm & Haas Co., Inc.

BIN & CHUTE DELIVERY MACHINES
Harwood & Sons, Geo. S.

BLADES
Corduroy Cutting ..... **A**
Staple Cutting ..... **B**
American Lava Corp., Titania Div. ..... B
Batson Co., Louis P. ..... A

BLANKETS
Compressive Shrinking ..... **A**
Endless ..... **B**
Palmer (See Blankets—Endless)
Printing (See Blankets—Endless)
Sanforized (See Blankets—Endless)
Steaming ..... **C**
Batson Co., Louis P. ..... A, B, C

BLEACHES
Bleaching Assistants ..... **A**
Bleaching Oils ..... **B**
du Pont de Nemours & Co., Inc., E. I., Electrochemicals Dept. ..... A
Emkay Chemical Co. ..... A
General Chmeical Div., Allied Chemical Corp. ..... A
Moretex Chemical Products, Inc. ..... A
Tennessee Corp. ..... A, B

BLEACHING AGENTS (See under individual headings: Calcium—Salts of—Hypochlorite Hydrogen, Peroxide, etc.)

BLEACHING MACHINES
Allen Son's Co., Wm., Div. O. G. Kelley & Co.
Birch Bros., Inc.
Butterworth & Sons Co., H. W.
Cocker Machine and Foundry Co.
Hunt Machine Co., Rodney
McKiernan-Terry Corp., Textile Machinery Div.
Proctor & Schwartz, Inc.
Rangette—See Hunt Co., Rodney
Riggs & Lombard Co.
Textile Shops

BLEACHING SERVICE (See Commission Services)

BLEACHING STEAMERS
Cocker Machine and Foundry Co.
Proctor & Schwartz, Inc.
Textile Shops

BLENDERS—*Fiber*
Custom Scientific Instrument, Inc.
Harwood & Son, Geo. S.
Proctor & Schwartz, Inc.

BLENDERS—*Stock* (See Blenders—Fiber)

BLENDING SERVICE (See Commission Services)

BLOCKS—*Hanger & Pillow*
Dodge Mfg. Corp.

BLOWERS (See Fans)

BLUESTONE (See Copper Sulfate)

BOARDERS—*Hosiery* (See Hosiery Drying Forms)

BOARDING MACHINES (See Hosiery Boarding & Preboarding Machines)

BOARDS—*Bobbin* (See Boards—Pin)

BOARDS
Bottom ..... **A**
Clearer ..... **B**
Cloth ..... **C**
Comber ..... **D**
Pin ..... **E**
Quill (See Boards—Pin)
Roving (See Boards—Pin)
Thread ..... **F**
Abbott Machine Co. ..... E
Batson Co., Louis P. ..... A, B, C, D, E, F
Excel Co., Inc. ..... E
Saco-Lowell Shops ..... B, F

BOBBIN-REPAIR MACHINES
Reiner, Inc., Robert
Southern Bobbin Works, Inc.

BOBBINS (See also Spools, also Tubes)
Bottle, Paper ..... **A**
Bottle, Wood ..... **B**
Braider ..... **C**
Card Room ..... **D**
Fibre & Plastic ..... **E**
Filling, Wood ..... **F**
Flat ..... **G**
Metal ..... **H**
Narrow Fabric ..... **I**
Spinning ..... **J**
Steaming ..... **K**
Synthetic Composition ..... **L**
Throwing ..... **M**
Adolff, Emil, Reutlingen/Wttg, Germany—Rep. by Textube Corp., Watson & Desmond, Crowther Limited ..... F
American Paper Tube Co. ..... E, J, K, L
Batson Co., Louis P. ..... B, D, E, F, J, L
Continental Diamond Fibre Corp. ..... E
Engineered Plastics, Inc. ..... E, J, K, L, M
Mirro-Aluminum Co. ..... H
National Vulcanized Fibre Co., Lestershire Div. ..... E
Parks Co., M. H. ..... C, D, F, J, K
Plasti-Weld—See American Paper Tube Co.
Plastic Mold & Engineering Co. ..... C, I, L
Sonoco Products Co. ..... E, J
Southern Bobbin Works, Inc. ..... D, E, F, J, K
Textile Shield Co., Inc. ..... H

BOILER FEED UNITS
Johnson Corp.

BOIL-OFF MACHINES
Birch Bros., Inc.
Butterworth & Sons Co., H. W.
Riggs & Lombard Co.
Textile Shops.

BOIL-OFF OILS (See Lubricants—Fiber, Process)

FOR ADVERTISING PAGE NUMBERS AND ADDRESSES SEE PG. 223

BOLSTERS—*Spinning & Twisting*
SKF Industries, Inc.
Saco-Lowell Shops

BORIC ACID (See Acids)

BOSS ROLLS (See Rolls—Drawing, Roving and Spinning)

BOW-CONTROL MACHINES
Mt. Hope Machinery Co.
Marshall & Williams Corp.

BOX LOOMS (See Looms under specific headings according to use)

BOX-STRAPPING MACHINES
Acme Steel Co.

BOXES—*Boiling-Out* (See Boil-off Machines)

BOXES—*Canvas* (See Baskets—Canvas)

BOXES—*Dye* (See Dyeing Machines)

BOXES
Fibre & Wood ..... A
Gill (See Gill Boxes)
Size ..... B
Starting (See Controls—Automatic & Manual Motor)
Steamer C
Stuffing (See Joints—Revolving)
Suction (See Extractors—Vacuum)
Tote ..... D
Batson Co., Louis P. ..... A, D
Birch Bros., Inc. ..... B, C
Excel Co., Inc. ..... A, C, D
Fisher Mfg. Co. ..... A, C, D
Continental Diamond Fibre Corp. ..... A
National Vulcanized Fibre Co., Kennettt Div. ..... A

BRAIDERS
Textile Machine Works

BRAKE LININGS
Batson Co., Louis P.

BREASTS—Card & Garnett
Davis & Furber Machine Co.

BRITISH GUM—(See Gums)

BROOMS (See Brushes—Industrial Cleaning Brushes, Brooms & Mops)

BRUSHES—*Cloth-Brushing Machine* (See Brushes—Machine Processing)

BRUSHES
Cloth-Brushing Machine (See Brushes—Machine Processing)
Dabbing ..... A
Hand (See Brushes—Industrial Cleaning Brushes, Brooms & Mops)
Industrial Cleaning Brushes, Brooms & Mops ..... B
Machine Processing C
Steaming Machine (See Brushes—Machine Processing)
Thread Dresser (See Brushes—Machine Processing)
Jenkins Sons, M. W. ..... A, B, C

BRUSHING MACHINES
Birch Bros., Inc.
Gessner Co., David
Riggs & Lombard Co.

BUCKETS & DIPPERS—Corrosion-Resistant
Excel Co., Inc.
Riggs & Lombard Co.

BUFFERS—*Cot*
Saco-Lowell Shops

BURLING & DESPECKING MACHINES
Birch Bros., Inc.
Riggs & Lombard Co.

BURNERS—*Infrared* (See Dryers—Infrared)

BURNERS—*Oil & Gas* (See Direct-Fired Conversion Units)

BURR-CRUSHING MACHINES
Davis & Furber Machine Co.
B. F. Perkins & Son Inc.
Riggs & Lombard Co.
Sargent's Sons Corp., C. G.

BUSHINGS
Bobbin ..... A
Bronze ..... B
Fiber C
Self-Lubricating ..... D
Synthetic-Composition ..... E
Batson Co., Louis P. ..... A, B, C, D, E
Continental Diamond Fibre Corp. C
Engineered Plastics, Inc. ..... A, C, E

BUTTON BREAKERS
Riggs & Lombard Co.

CAFETERIA EQUIPMENT
Taylor Co., Halsey W.

CALENDER ROLLS (See Rolls—Calender)

CALENDERS
Chasing ..... A
Circular & Flat Knit ..... B
Embossing C
Friction ..... D
Ribbon ..... H
Rolling ..... E
Schreiner ..... F
Silk ..... G
Birch Bros., Inc. ..... C, E
Butterworth & Sons Co., H. W. ..... A, C, D, E, F
McKiernan-Terry Corp., Textile Machinery Div. ..... A, C, D, E, F, G
B. F. Perkins & Son Inc.
Reiner, Inc., Robert ..... F
Riggs & Lombard Co. ..... D, E
Utica Novelty & Mill Specialty Co. ..... B

CAMS
Engineered Plastics, Inc
B. F. Perkins and Son Inc.

CANDELILLA WAX (See Waxes—Natural)

CANS
Drying ..... A
Roving (See Sliver)
Sliver ..... B
Safety C
Carroll & Co., J. E. ..... A
National Vulcanized Fibre Co., Kennett Div. ..... B
B. F. Perkins & Son Inc. ..... A
Sims Metal Works ..... B, C
Textile Shops ..... A
Turbo Machine Co. ..... B

CAP SPINNING FRAMES (See Spinning Frames—Worsted)

CARBOLIC ACID (See Acids)

CARBONIZERS
Piece Goods ..... A
Raw Stock ..... B
Birch Bros., Inc. ..... A
Lanly Co. ..... A, B
Proctor & Schwartz, Inc. ..... A, B
Riggs & Lombard Co. ..... A
Sargent's Sons Corp., C. G. ..... B
Wiegand Co., Edwin L.

CARBONIZING AGENTS
Emkay Chemical Co.
General Chemical Div., Allied Chemical Corp.
Tennessee Corp.

CARD CLOTHING
Metallic ..... A
Wire ..... B
Booth Co., Benjamin ..... B
Davis & Furber Machine Co. ..... A, B
Proctor & Schwartz, Inc. ..... A
Saco-Lowell Shops ..... B

CARD CLOTHING MOUNTING MACHINES (See Winders—Fillet)

CARD CLOTHING SERVICE
Booth Co., Benjamin
Davis & Furber Machine Co.
Proctor & Schwartz, Inc.
Saco-Lowell Shops

CARD GRIDS—(See Grids—Card)

CARD PARTS
Batson Co., Louis P.
Davis & Furber Machine Co.
Proctor & Schwartz, Inc.
Saco-Lowell Shops

CARLOADING SERVICE (See also Trucking Service)

CARD-GRINDING MACHINES (See Grinders—Card, Garnett & Napper)

CARD-LACING MACHINES (See Jacquard Card-Lacing Machines)
Societe Alsacienne de Constructions Mechaniques, Mulhouse, France—Rep. in U.S.A. by Atkinson, Haserick & Co. ..... A, F, H
Saco-Lowell Shops ..... A, E
Proctor & Schwartz, Inc. ..... E, F, G
Davis & Furber Machine Co. ..... B, C, D, E, F, G, H

CARDS
Cotton ..... A
Cotton Waste ..... B
Hand C
Sampling ..... D
Synthetic Staple ..... E
Woolen ..... F
Worsted ..... G

CARRIERS—Braider
Textile Machine Works

CARRIERS—*Dye* (See Dye Carriers)

CARRIERS—*Yarn Package* (See Bobbins, Cones, Quills, etc.)

CASTERS & WHEELS—*Truck*
Bassick Co.
Excel Co., Inc.
Faultless Caster Co.
National Vulcanized Fibre Co., Kennett Div.

CASTINGS
Aluminum ..... A
Iron ..... B
Nickel Alloy C
Stainless Steel ..... D
Batson Co., Louis P. ..... A, B, C
Cocker Machine and Foundry Co. ..... A, B, C, D

CASTOR OIL (See Oil—Natural)

CASTOR OIL—Sulfonated (See Wetting Agents)

CAUSTIC POTASH (See Potassium—Salts of—Hydroxide)

CAUSTIC SODA (See Sodium—Salts of)

CEILING CONDENSERS
Proctor & Schwartz, Inc.
Sargent's Sons Corp., C. G.
Engineered Plastics, Inc.

CELLULOSE ACETATE
Batson Co., Louis P.

CENTRIFUGALS (See Extractors—Centrifugal)

CHAINS
Card ..... A
Conveyor & Elevator ..... B
Power-Transmission (Roller) C
Power-Transmission (Silent) ..... D
Dodge Mfg. Corp. C
Ferguson Gear Co. ..... C, D
National Drying Machine Co., Inc. ..... B
Saco-Lowell Shops ..... A

CHALK—*Colored* (See Crayons—Marking, also Calcium—Salts of—Carbonate)

CHANGEOVERS—*Drawing*
Batson Co., Louis P.
Gastonia Roller, Flyer & Spindle Co.
Saco-Lowell Shops

CHANGEOVERS—*Roving, Drafting*
Batson Co., Louis P.
Gastonia Roller, Flyer & Spindle Co.
Saco-Lowell Shops

CHANGEOVERS—*Spinning*
Band to Tape ..... A
Drafting ..... B
Increased Traverse C
Batson Co., Louis P. ..... B, C
Gastonia Roller, Flyer & Spindle Co. ..... B
Saco-Lowell Shops ..... A, B, C

CHANGEOVERS—*Twister*
Batson Co., Louis P.
Gastonia Roller, Flyer & Spindle Co.
Saco-Lowell Shops
Universal Winding Co.

CHANGEOVERS—*Winder*
Batson Co., Louis P.
Foster Machine Co.
Saco-Lowell Shops
Universal Winding Co.

FOR ADVERTISING PAGE NUMBERS AND ADDRESSES SEE PG. 223

CHELATING AGENTS
Emkay Chemical Co.
Moretex Chemical Products, Inc.
Polymer Industries

CHROME ALUM
General Chemical Div., Allied Chemical Corp.

CHROMIUM ACETATE (See Mordants)

CHROMIUM CHLORIDE (See Mordants)

CHROMIUM FLUORIDE (See Mordants)

CITRIC ACID (See Acids)

CLEANERS—*Chemical*
Cotton ..... A
Loom ..... B
Needle C
Reed ..... D
Spinning Frame Roll ..... E
du Pont de Nemours & Co., Inc., E. I., Electrochemical Dept. ..... A, B, C, D
Emkay Chemical Co. ..... A, B, C, D, E
Harshaw Chemical Co. ..... A, B, C, D, E

CLEANERS—*Mechanical*
Loom ..... A
Reed ..... B
Spinning Frame Roll C
Bahnson Co., The ..... A
Batson Co., Louis P. C
Cross-Jet—See Bahnson Co.
Jenkins Sons, M. W. ..... B

CLEANERS—*Portable Industrial Floor Vacuum & Blowers*
Finneli System, Inc.
Siddall Co., Inc., Geo. F.

CLEANERS—*Traveling Blower*
Aero-Sweep—See Bahnson Co.
Bahnson Co.

CLEANERS—*Vacuum* (See Cleaners—Portable Industrial Floor Vacuum, or Strippers—Card, also Collectors—Broken End, Dust & Fume, or Lint & Fly)

CLEARERS
Flat & Revolving ..... A
Roll ..... B
Spring C
Batson Co., Louis P. ..... A, B, C
Saco-Lowell Shops ..... A, B

CLIPPERS—*Selvage-Loop* (See Cutters—Selvage-Loop)

CLIPS
Strapping ..... A
Tenter ..... B
Acme Steel Co. ..... A
Batson Co., Louis P. ..... A, B
Butterworth & Sons Co., H. W. ..... B
Marshall & Williams Corp. ..... B

CLOCKS (See Counters)

CLOTH (See also Blankets)
Buffing ..... A
Card Grinding ..... B
Filter C
Mechanical ..... D
Batson Co., Louis P. ..... A, C, D
Roy & Son, B. S. ..... B

CLOTH BRUSHING MACHINES (See Brushing Machines)

CLOTH LUSTERING MACHINES (See Lustering Machines)

CLOTH MARKING MACHINES (See Marking Machines)

CLOTH MEASURING MACHINES (See Counters—Cloth Yardage)

CLOTHING—*Card* (See Card Clothing)

CLOTHING—*Napper* (See Napper Clothing)

CLUTCHES
Friction ..... A
Magnetic ..... B
Batson Co., Louis P. ..... B
Dodge Mfg. Corp. ..... A

COATING AGENTS (See Under Individual Headings, Cellulose, Acetate, Pyroxylin, etc.)

COATING MACHINES—*Fabric*
Birch Bros., Inc.
Hunt Machine Co., Rodney
Lanly Co.
Textile Shops

COCONUT OIL (See Oil—Natural)

COILERS—*Warp & Sliver*
Cocker Machine & Foundry Co.
Davis & Furber Machine Co.
Proctor & Schwartz, Inc.
Societe Alsacienne de Constructions Mechaniques, Mulhouse, France—Rep. in U.S.A. by Atkinson, Haserick & Co.

COILS—*Pipe* (See also Plates—Heating & Cooling)
Crane Co.
Crucible Steel Co. of America

COLLECTORS
Broken End & Noil Vacuum ..... A
Lint & Fly ..... B
Yarn, Vacuum C
Bahnson Co. ..... A, B, C
Batson Co., Louis P. ..... A, C
Davis & Furber Machine Co., ... A, C

COMBER PARTS—*Cotton*
Batson Co., Louis P.
Saco-Lowell Shops

COMBERS
Cotton ..... A
Worsted (French or Rectilinear) ..... B
Saco-Lowell Shops ..... A
Schlumberger & Cie ..... B
Societe Alsacienne de Constructions Mechaniques, Mulhouse, France—Rep. in U.S.A. by Atkinson, Haserick & Co. ..... A, B

COMBS
Beamer, Warper & Slasher ..... A
Doffing ..... B
Expansion C
Cocker Machine & Foundry Co. ..... A, C
Davis & Furber Machine Co. ..... B
Saco-Lowell Shops ..... B

COMMISSION SERVICES
Plastic Coating for Machine Parts ..... A
Testing Laboratories (See Laboratories—Testing)
Engineered Plastics, Inc. ..... A

COMPENSATORS—*Cloth*
Birch Bros., Inc.
Carroll & Co., J. E.
Cocker Machine & Foundry Co.
Hunt Machine Co., Rodney
McKiernan-Terry Corp., Textile Machinery Div.
Mt. Hope Machinery Co.
B. F. Perkins & Sons Inc.
Riggs & Lombard Co.
Textile Shops

COMPENSATORS—*Motor Starting* (See Controls—Automatic and Manual Motor)

COMPLEXING AGENTS
Emkay Chemical Co.
Moretex Chemical Products, Inc.

COMPRESSORS—*Thread* (See Thread Compressors)

COMPRESSORS—*Warp* (See Warp Compressors)

CONDENSATION RETURN UNITS
Johnson Corp.

CONDENSERS—*Apron* (See Tape Condensers)

CONDENSERS—*Ceiling* (See Cotton Condensers)

CONDENSERS—*Cotton* (See Cotton Condensers)

CONDENSERS—*Ring Doffer* (See Ring Doffer Condensers)

CONDENSERS—*Tape* (See Tape Condensers)

CONDITIONERS—*Air* (See Air Conditioners)

CONDITIONERS—*Cloth* (See Dryers—Piece Goods, or Ovens—Conditioning)

CONDITIONERS—*Hosiery* (See Ovens—Conditioning)

CONDITIONERS—*Water* (See Water Treatment)

CONDITIONERS—*Yarn* (See also Dryers)
Andrews & Goodrich Div. of Midland-Ross Corp.
Industrial Dryer Corp.
Proctor & Schwartz, Inc.
Riggs & Lombard Co.
Sargent's Sons Corp., C. G.

CONDITIONING AGENTS
Emkay Chemical Co.

CONDITIONING OVENS (See Ovens—Conditioning)

CONES
Fibre & Synthetic ..... A
Paper ..... B
Perforated (See Tubes—Perforated)
Wood C
Engineered Plastics, Inc. ..... A
Sonoco Products Co. ..... A, B
Southern Bobbin Works, Inc. C
Yarnsaver—See Sonoco Products Co.

CONSULTANTS (See also Engineering Services and Research)
Cost ..... A
Management ..... B
Materials Handling C
Machinery Transportation ..... D
Production Control ..... E
Emkay Chemical Co. ..... C, E
Thomason Textile Service, Inc. ..... B, E
Turner Transfer ..... D
Werner Textile Consultants ..... A, B, C, E
Whiting Products C

CONTROLS
Automatic Detwisting ..... A
Automatic & Manual Motor ..... B
Combustion (See Regulators—Damper & Draft)
Dyeing Machine C
Filling Straightening (See Filling Straightening Devices)
Humidity ..... D
Moisture (See Controls—Humidity)
Picker ..... E
Pressure & Vacuum ..... F
Slasher ..... G
Speed (See Transmissions—Variable-Speed)
Temperature ..... H
Tension-Winding I
Time-Cycle ..... J
Water Blending (See Controls—Temperature)
Livingston & Haven, Inc. ..... E, F, G, J
Mt. Hope Machinery Co. ..... A, I
Marshall & Williams Corp. I
Bahnson Co. ..... D
Cocker Machine and Foundry Co. ..... B, G, H, I
Turbo Machine Co. C

CONVEYORS
Apron, Belt or Bucket ..... A
Chain ..... B
Pneumatic C
Screw or Spiral ..... D
Andrews & Goodrich Div. of Midland-Ross Corp.
Harwood & Son, Geo. S. ..... A
National Drying Machine Co., Inc. ..... A, B, D
Proctor & Schwartz, Inc. ..... A, C
Redler—See Stephens-Adamson Co.
Riggs & Lombard Co. ..... A
Saco-Lowell Shops ..... A
Sargent's Corp., C. G. ..... A, B, C
Stephens-Adamson Mfg. Co. ..... A
Textile Shops C

COOLERS—*Air* (See Air Conditioners)

COOLERS—*Drinking Water* (See Coolers—Water)

COOLERS—*Evaporative* (See Humidifiers—Room)

COOLERS—*Water*
Taylor Co., Halsey W.

COP HOLDERS (See Holders—Cop)

COPPER CHLORIDE (See Cupric & Cuprous—Salts of—Chloride)

FOR ADVERTISING PAGE NUMBERS AND ADDRESSES SEE PG. 223

COPPER NITRATE (See Cupric—Salts of—Nitrate)

COPPER SULFATE
Tennessee Corp.

COPPER SULFIDE (See Cupric—Salts of—Sulfide)

COPS (See Bobbins)

CORDAGE MACHINES
Allen Son's Co., Wm., Div. O. G. Kelley & Co.

CORES
Aluminum ..... A
Paper ..... B
Steel C
Wood ..... D
Batson Co., Louis P. ..... A, C, D
Durowold—See Sonoco Products Co.
Engineered Plastics, Inc. ..... A
Jenkins Sons, M. W. ..... A, C, D
North Waterford Spool Co. ..... D
Sonoco Products Co. ..... B

CORN STARCH (See Starch—Natural)

CORN SUGAR (See Glucose)

CORN SYRUP (See Glucose)

CORROSION PREVENTIVES
Emkay Chemical Co.
Engineered Plastics, Inc.
Textile Adjuncts Corp.

COT BUFFERS (See Buffers—Cot)

COTS
Batson Co., Louis P.
Dixon Corp.
Sonoco Products Co.

COTTON CONDENSERS
Saco-Lowell Shops

COUNTERS
Cloth Yardage ..... A
Electrical ..... B
Hank (See Counters—Yarn Yardage)
Loom Pick C
Operation (See also Loom Pick) ..... D
Twist (See Testers—Twist)
Yarn Yardage ..... E
Cocker Machine and Foundry Co. ..... B, D, E
Davis & Furber Machine Co. ..... D
B. F. Perkins & Son, Inc. ..... A
Veeder-Root, Inc. ..... B, C, D, E

COUPLING AGENTS—*Chemical*
Emkay Chemical Co.
Polymer Industries
Textile Adjuncts Corp.
Verona Dyestuffs

COUPLINGS—*Hydraulic or Shaft*
Alemite Div., Stewart Warner Corp. ..... A
Dodge Mfg. Corp. ..... B
Lincoln Engineering Co. ..... A

COVERINGS (See also Cots)
Cork Roll ..... A
Leather Roll ..... B
Molded Phenolic Roll C
Rubber Roll ..... D
Seamless, Card Roll ..... E
Take-up Drum ..... F
Batson Co., Louis P. ..... A, B, C, D, E, F
Engineered Plastics, Inc. C
Mt. Hope Machinery Co. ..... D

COVERS—*Roll* (See Coverings or Cots)

CRABBING MACHINES
Birch Bros., Inc.
Gessner Co., David
Butterworth & Sons Co., H. W.
Riggs & Lombard Co.

CRADLES—*Cloth* (See Scrays & Cradles—Cloth)

CRADLES—*High Draft*
Dixon Corp.
Young Machine Co., F. A.

CRANES—*Portable Stacking* (See Trucks—Elevating and Stacking)

CRANK ARMS (See Turnings—Wood)

CRANKSHAFTS—*Loom*
Draper Corp.
Fletcher Works

CRAYONS—*MARKING*
Jiffy Textile Marker Co.
Polymer Industries

CREASEPROOFING COMPOUNDS
Emkay Chemical Co.
Rohm & Haas Co., Inc.

CREELS
Direct-Weaving ..... A
Jack Spool (See Spoolers—Jack)
Knitting ..... B
Slasher C
Spinning ..... D
Warper ..... E
Bahnson Co. ..... D
Batson Co., Louis P. ..... A, C, D, E
Cocker Machine and Foundry Co.
Davis & Furber Machine Co. ..... E
Reiner, Inc., Robert ..... A, B, E
Saco-Lowell Shops ..... C, D
Societe Alsacienne de Constructions Mechaniques, Mulhouse, France—Rep. in U.S.A. by Atkinson, Haserick & Co. ..... D, E
Textile Shops ..... G

CRIMPERS—*Fiber*
Turbo Machine Co.

CUPRIC & CUPROUS—*Salts*
Acetate ..... A
Chloride ..... B
Nitrate C
Sulfide ..... D
General Chemical Div., Allied Chemical Corp. C
Tennessee Corp. ..... A, B, C, D

CUT METERS (See Counters—Cloth—Yardage)

CUTTERS
Selvage-Loop ..... A
Strip (See Slitters—Cloth)
Swatch (See Pinking Machines)
Thread ..... B
Velveteen, Pile, etc. C
Batson Co., Louis P. ..... B, C
Reiner, Inc., Robert ..... A

CUTTING & FOLDING MACHINES
Riggs & Lombard Co.

CYLINDERS (See also Rolls)
Card ..... A
Drying (See Cylinders—Slasher, and Cans—Drying)
Picker (See Lags—Picker)
Slasher ..... B
Spinning C
Spooler (See Cylinders—Spinning)
Twister Cylinders and Troughs (See Cylinders—Spinning)
Carroll & Co., J. E. ..... B
Cocker Machine & Foundry Co. ..... B
Davis & Furber Machine Co. ..... A, C
Saco-Lowell Shops ..... A
Textile Shops ..... B, C

DABBING BRUSHES (See Brushes—Dabbing)

DAMPERS—*Cloth* (See Dewing Machines)

DECATING MACHINES
Gessner Co., David
Riggs & Lombard Co.

DEFOAMING AGENTS (See Antifoaming Agents)

DEGREASING MACHINES (See Scouring Machines—Raw Stock)

DEGUMMING AGENTS
Emkay Chemical Co.
Moretex Chemical Products, Inc.
Rohm & Haas Co., Inc.

DEGUMMING MACHINES
Birch Bros., Inc.
Riggs & Lombard Co.

DEIONIZERS—*Water* (See Water Treatment—Softening Equipment)

DELIQUESCENTS (See Hygroscopic Agents)

DELUSTERING AGENTS & ASSISTANTS
Emkay Chemical Co.
Moretex Chemical Products, Inc.
Polymer Industries
Rohm & Haas Co., Inc.

DEODORANTS (See Odor-Masking Agents)

DESIZERS—*Fabric* (See Washing Machines)

DESIZING AGENTS
Exsize-T—See Pabst Brewing Co.
General Chemical Div., Allied Chemical Corp.
Pabst Brewing Co.
Rohm & Haas Co., Inc.
Texzyme—See Pabst Brewing Co.

DESPECKING MACHINES (See Burling & Despecking Machines)

DETACKING MACHINES
Birch Bros., Inc.
Riggs & Lombard Co.

DETECTORS—*Uniformity* (See also Testers—Yarn Evenness)
Universal Winding Co.

DETERGENTS (See also Soaps)
Detergents ..... A
Dispersing Agents ..... B
Dyeing Assistants C
Emkay Chemical Co. ..... A, B, C
General Chemical Div., Allied Chemical Corp. ..... A, B, C
Mortex Chemical Products, Inc. ..... A, B, C
Polymer Industries ..... A, B, C
Rohm & Haas Co., Inc. ..... A, B, C
Siddall Co., Inc., Geo. F. ..... A
Standard Soap Div., Concord Chemical Co., Inc. ..... A, C
Tennessee Corp. ..... A, C
Textile Adjuncts Corp. ..... A, B
Verona Dyestuffs ..... B, C

DETWISTING MACHINES
Birch Bros., Inc.
Mt. Hope Machinery Co.
Riggs & Lombard Co.

DEWING MACHINES
Birch Bros., Inc.
Gessner Co., David
Riggs & Lombard Co.

DEXTRIN
Staley Mfg. Co., A. E.

DIASTASE (See Desizing Agents)

DICHLOROMETHANE
du Pont de Nemours & Co., Inc., E. I., Electrochemicals Dept.

DIPPERS (See Buckets & Dippers)

DIRECT DYES (See Dyes)

DIRECT-FIRED CONVERSION UNITS
Lanly Co.

DISCHARGE-PRINTING AGENTS (See Reducing Agents)

DISODIUM PHOSPHATE (See Sodium—Salts of—Phosphate, Dibasic)

DISPERSING AGENTS (See Detergents)

DIVIDERS—*Knitting Machine* (See Sinkers & Dividers)

DOBBY BARS (See Lags)

DOLLIES
Batson Co., Louis P.
Excel Co., Inc.
Fisher Mfg. Co.

DOUBLERS
Cloth ..... A
Warp & Splitters ..... B
Yarn C
Birch Bros., Inc. ..... A
Cocker Machine and Foundry Co. ..... B
Foster Machine Co. C
Riggs & Lombard Co. ..... A
Societe Alsacienne de Constructions Mechaniques, Mulhouse, France—Rep. by Atkinson, Haserick & Co. C

DOUBLE TWISTERS (See Throwing Machines)

DRAFTERS—*Pin* (See Pin Drafters & Gill Reducers)

DRAWING FRAMES
Cotton ..... A
Worsted ..... B
Duo-Roth—See Saco-Lowell Shops
Saco-Lowell Shops ..... A, B
Shaw—See Saco-Lowell Shops
Societe Alsacienne de Constructions Mechaniques, Mulhouse, France—Rep. in U.S.A. by Atkinson, Haserick & Co. ..... A, B
Versa-matic—See Saco-Lowell Shops

FOR ADVERTISING PAGE NUMBERS AND ADDRESSES SEE PG. 223

DRIVES
- **Adjustable-Speed (See Transmissions—Variable Speed)**
- **Card** ..... A
- **Chain** ..... B
- **Enclosed-Gear (See Reducers—Speed)**
- **Fluid (See Drives—Hydraulic)**
- **Gear** C
- **Hydraulic** ..... D
- **Slasher** ..... E
- **Spinning Frame** ..... F
- **V-Belt (See Belts—V)**
- **Variable-Speed (See Transmissions—Variable-Speed)**

Cocker Machine and Foundry Co. ..... B, C, D, E
Davis & Furber Machine Co. ..... A, E
Dodge Mfg. Corp. ..... A, B, C, F
Ferguson Gear Co. ..... B, C, F
Perfecting Service Co. ..... A
Saco-Lowell Shops ..... A, E, F

DROP WIRES (See Stop Motions)

DRUMS
- **Fibre** ..... A
- **Metal** ..... B
- **Wood** C

Batson Co., Louis P. ..... B, C
National Vulcanized Fibre Co., Kennett Div. ..... A
Sonoco Products Co. ..... A

DRY CANS (See Cans—Drying)

DRY-CLEANING MACHINES
Riggs & Lombard Co.

DRYER HOUSINGS—Tenter Frame
Andrews & Goodrich Div. of Midland-Ross Corp.
Dalton Sheet Metal, Inc.
Lanly Co.
National Drying Machine Co., Inc.
Proctor & Schwartz, Inc.
Textile Shops

DRYERS
- **Apron (See Dryers—Raw Stock)**
- **Backwasher** ..... A
- **Blanket (See Dryers—Piece Goods)**
- **Carbonizer** ..... B
- **Carpet (See Dryers—Piece Goods)**
- **Centrifugal (See Extractors—Centrifugal)**
- **Cloth (See Dryers—Piece Goods)**
- **High-Frequency or Dielectric** C
- **Hosiery (See Hosiery—Boarding & Preboarding Machines)**
- **Infrared Burners & Lamps** ..... D
- **Knit Goods** ..... E
- **Non-Woven** ..... F
- **Piece Goods** ..... G
- **Radiant Heat** ..... H
- **Raw Stock** I
- **Rayon Cake** ..... J
- **Skein** ..... K
- **Tufted Textiles (See Dryers—Piece Goods)**
- **Warp** L
- **Yarn Package** ..... M

Abbott Machine Co. ..... M
Andrews & Goodrich Div. of Midland-Ross Corp. ..... A, B, C, D, E, G, H, I, J, K, L, M
Butterworth & Sons Co., H. W. ..... G, L
Carroll & Co., J. E. ..... A, G
Cocker Machine & Foundry Co. L
Dalton Sheet Metal, Inc. ..... G
Gessner Co., David ..... G
Industrial Coatings, Inc. L
Lanly Co. ..... A, B, D, E, G, I, J, K, L, M
National Drying Machine Co., Inc. ..... B, G, I, J, K, M
Proctor & Schwartz, Inc. ..... E, F, G, J, K, M
Sargent's Sons Corp., C. G. ..... A, B, I, K
Textile Shops ..... G, L
Turbo Machine Co. ..... M
Utica Novelty & Mill Specialty Co. ..... E
Wiegand Co., Edwin L. ..... D

DYE BECKS (See Dyeing Machines—Piece Goods or Reel)

DUCTS
Andrews & Goodrich Div. of Midland-Ross Corp.
Bahnson Co.
Lanly Co.
Sonoco Products Co.
Textile Shops

DULLING AGENTS (See Delustering Agents)

DUSTING MACHINES
- **Carbonized Cloth** ..... A
- **Cone (See Dusting Machines—Wool & Waste)**
- **Rag (See Dusting Machines—Wool & Waste)**
- **Wool & Waste** ..... B

Davis & Furber Machine Co. ..... B
Riggs & Lombard Co. ..... A
Sargent's Sons Corp., C. G. ..... B

DYEING ASSISTANTS (See Detergents)

DYEING MACHINES
- **Beam (See Dyeing Machines—Warp)**
- **Cake (See Dyeing Machines—Package)**
- **High Pressure & Temperature** ..... A
- **Indigo** ..... B
- **Jig Type** C
- **Knit Goods (Paddle or Rotary)** ..... D
- **Package** ..... E
- **Padders** ..... F
- **Paddle (See Dyeing Machines—Reel)**
- **Piece Goods** ..... G
- **Raw Stock** ..... H
- **Reel** I
- **Skein** ..... J
- **Top** ..... K
- **Warp** L
- **Yarn (See Dyeing Machines—Warp or Package)**

Abbott Machine Co. ..... A, E, K
Allen Son's Co., Wm., Div. O. G. Kelley & Co. ..... K
Birch Bros., Inc. ..... C, F, G, L
Butterworth & Sons Co., H. W. ..... C, F
Cocker Machine & Foundry Co. ..... B, F, L
Hunt Machine Co., Rodney ..... D, F, G
Klauder Weldon Giles Machine Co. ..... D, H, I, J
McKiernan-Terry Corp., Textile Machinery Div. ..... C, F, J
Niptrol—See Hunt Co., Rodney
Riggs & Lombard Co. ..... A, B, D, F, G, H, I, K
Textile Shops ..... F, G
Tru-Shade—See Hunt Co., Rodney
Turbo Machine Co. ..... A, E, H, J, K, L
Wringmaster—See Hunt Co., Rodney

DYES (See also Lake Colors or Pigments)
- **Acetate** ..... A
- **Acid** ..... B
- **Alizarine** C
- **Aniline** ..... D
- **Basic** ..... E
- **Developed** ..... F
- **Direct** ..... G
- **Mordant** ..... H
- **Naphthol (Azo; Azoic)** I
- **Sulfur** ..... J
- **Vat** ..... K

Anthrasol—See Carbic Hoechst Corp.
Carbic Hoechst Corp., Inc. ..... A, B, C, E, F, G, H, I, J, K
Celliton—See General Dyestuff Co.
Genacron—See General Dyestuff Co.
Genacryl—See General Dyestuff Co.
General Dyestuff Co., Sales Div., General Aniline & Film Corp. ..... A, B, E
Harshaw Chemical Co. ..... B, C, D, H, I
Hostalan—See Carbic Hoechst Corp.
Hostavat—See Carbic Hoechst Corp.
Ofna-perl—See Carbic Hoechst Corp.
Ofna-ryl—See Carbic Hoechst Corp.
Remalan—See Carbic Hoechst Corp.
Ramastral—See Carbic Hoechst Corp.
Supralan—See General Dyestuff Co.
Verona Dyestuffs ..... A, B, C, E, F, G, H, I, J, K

DYESTICKS
Klauder Weldon Giles Machine Co.

DYESTUFFS (See Dyes)

DYEWOOD EXTRACTS (See Dyes)

EDGING MACHINES (See Sewing Machines)

ELECTROMAGNETS—*Separating* (See Separators—Magnetic)

ELIMINATORS—*Slack-Selvage* (See also Static Neutralizers & Eliminators)
Mt. Hope Machinery Co.
Re'ner, Inc., Robert

EMBOSSING MACHINES (See Calenders)

EMBROIDERING MACHINES
Reiner, Inc., Robert

EMULSIFYING AGENTS & ASSISTANTS (See also Soaps & Lubricants)
Emkay Chemical Co.
Moretex Chemical Products, Inc.
Rohm & Haas Co., Inc.
Staley Mfg. Co., A. E.
Textile Adjuncts Corp.

ENGINEERING SERVICES (See also Consultants, and Research)
- **Appraisals** ..... A
- **Architectural** ..... B
- **Chemical (Textile)** C
- **Economic Studies & Reports** ..... D
- **Heating** ..... E
- **Industrial** ..... F
- **Mill Construction** ..... G
- **Plant-Site Investigation** ..... H
- **Quality Control** I
- **Steam Power Plants** ..... J

Lockwood Greene Engineers, Inc. ..... A, B, C, D, E, G, H, J
Loper Co., Ralph E. ..... D, F
Main, Inc., Charles T. ..... A, B, D, F, G, H, J
Robert & Co., Associates ..... A, B, D, E, G, H, J
Sirrine Co. ..... A, B, C, D, E, F, G, H, J
Thomason Textile Service, Inc. ..... D, F, I
Werner Textile Consultants ..... A, D

EXHAUSTERS (See Fans—Exhaust & Ventilating)

EXAMINING MACHINES (See Hosiery Examining Forms or Measuring Machines)

EXPANDERS—*Cloth*
Birch Bros., Inc.
Free-Wheeling—See Mt. Hope Machinery Co.
Jenkins Sons, M. W.
Mt. Hope Machinery Co.
Riggs & Lombard Co.
Vari-Bow—See Mt. Hope Machinery Co.

EXTRACTORS
- **Centrifugal** ..... A
- **Compression** ..... B
- **Pressure** C
- **Vacuum** ..... D

Birch Bros., Inc. ..... C, D
Gessner Co., David ..... B, D
Proctor & Schwartz, Inc. ..... B
Riggs & Lombard Co. ..... C, D
Sargent's Sons Corp., C. G. ..... A
Turbo Machine Co. ..... A, C

EYES—*Pot* (See Pot Eyes, or Guides—Thread)

FABRICS—*Mechanical* (See Cloth—Mechanical, or Blankets—Endless)

FACTORS—*Textile*
Dommerich & Co., L. F.

FANS
- **Centrifugal** ..... A
- **Exhaust & Ventilating** ..... B
- **Pressure** C
- **Propeller** ..... D

Andrews & Goodrich Div. of Midland-Ross Corp. ..... B, D
Bahnson Co. ..... B, C, D
National Drying Machine Co., Inc. ..... A
Saco-Lowell Shops ..... B

FASTENERS
- **Belt & Tape** ..... A
- **Bolts, Nuts, Pins, Screws, Pins, etc.** ..... B

Acme Steel Co. ..... B
Booth Co., Benjamin ..... A

FOR ADVERTISING PAGE NUMBERS AND ADDRESSES SEE PG. 223

FATTY—*Acid Esters*
Emkay Chemical Co.
Moretex Chemical Products, Inc.

FATTY ALCOHOLS
Emkay Chemical Co.

FATTY-ALCOHOL SULFATES
Emkay Chemical Co.

FEEDERS
Blending ..... A
Card ..... B
Chemical C
Continuous Roll ..... D
Dryer (See Feeders—Raw Stock)
Duster, Garnett & Lumper Willow ..... E
Fearnaught Picker (See Feeders—Picker)
Hopper (See Feeders—Raw Stock)
Intermediate Wool Card ..... F
Loom Filling ..... G
Opener ..... H
Picker I
Raw Stock ..... J
Washer (See Feeders—Raw Stock)
Bramwell—See Harwood & Son Inc.
Curlator Corp. ..... A
Harwood & Son, Inc., Geo. S. ..... A, B, E, H, I, J
Davis & Furber Machine Co. ..... A, B, E, F, H, I, J
Mt. Hope Mahcinery Co. ..... D
National Drying Machine Co., Inc. ..... C, J
Proctor & Schwartz, Inc. ..... A, B, E, G, J
Rando-Feeder—See Curlator Corp.
Saco-Lowell Shops ..... A, B, H, I
Sargent's Sons Corp., C. G. ..... H, I, J

FELTING MACHINES (See also Mills—Fulling)
Riggs & Lombard Co.

FELTS—*Mechanical*
Batson Co., Louis P.
Western Felt Works

FENCING—*Chain Link or Iron Picket*
Cyclone Fence Dept., American Steel & Wire Div.

FERROUS & FERRIC—*Salts of Sulfate*
Tennessee Corp.

FIBERS (See Yarns & Fibers)

FIBRE—*Vulcanized*
Continental Diamond Fibre Corp.
Engineered Plastics, Inc.
National Vulcanized Fibre Co.

FILLET WINDER (See Winders—Fillet)

FILLETS—*Emery*
Roy & Son, B. S.

FILLING—*Straightening Machines & Devices*
Birch Bros., Inc.
Mt. Hope Machinery Co.

FILTERS
Filters—*Air*
***Water* (See Purifiers—Water)**
Bahnson Co.
Lincoln Engineering Co.
Perfecting Service Co.
Saco-Lowell Shops

FINANCING (See Factors)

FINISHING AGENTS (See under individual headings: Dextrin, Gums, Starches, Lubricants, etc.)

FINISHING MACHINES (See under individual headings: Calenders, Dyeing Machines, etc., depending upon process involved)

FIRE RESISTANTS (See Flame Retarding Agents)

FITTINGS
Corrosion-Resisting ..... A
Malleable-Iron & Steel ..... B
Stainless Steel (See Fittings—Corrosion-Resisting)
Steel Pipe (See Fittings—Malleable-Iron & Steel)
Allen Son's Co., Wm., Div. O. G. Kelley & Co. ..... B
Engineered Plastics, Inc. ..... A

FIXING AGENTS
Emkay Chemical Co.
Moretex Chemical Products, Inc.
Polymer Industries

FLAME-RETARDING AGENTS
Emkay Chemical Co.
Moretex Chemical Products, Inc.
Textile Adjuncts Corp.

FLOOR CLEANING, SANDING, SCRUBBING & POLISHING MACHINES (See also Cleaners—Portable Industrial Floor Vacuum)
Finnell System, Inc.

FLOOR CLEANING MATERIALS
Emkay Chemical Co.
Finnell System, Inc.
Jenkins Sons, M. W.

FLOOR CONSTRUCTION MATERIALS
Acme Steel Co.

FLYERS
Cotton ..... A
Man-Made Fibers, Silk ..... B
Worsted C
Gastonia Roller, Flyer & Spindle Co. ..... A, B, C
Saco-Lowell Shops ..... A, B, C
Societe Alsacienne de Constructions Mechaniques, Mulhouse, France—Rep in U.S.A. by Atkinson, Haserick & Co. ..... A, C

FLYER SPINNING FRAMES (See Spinning Frames—Worsted)

FLY FRAMES (See Roving Frames)

FOG ELIMINATORS
Textile Adjuncts Corp.

FOLDERS
Cloth ..... A
Warp ..... B
Birch Bros., Inc. ..... A
Butterworth & Sons Co., H. W. ..... A, B
Cocker Machine & Foundry Co. ..... B
Gessner Co., David ..... A
McKiernan-Terry Corp., Textile Machinery Div. ..... A
Riggs & Lombard Co.

FORMALDEHYDE
du Pont de Nemours & Co., Inc., E. I., Electrochemicals Dept.
Harshaw Chemical Co.

FORMERS—*Cordage* (See Cordage Machines)

FORMIC ACID (See Acids)

FORMS (See Hosiery Forms)

FOUNTAINS (See Coolers—Water)

FULL-FASHIONED HOSIERY KNITTING MACHINES (See Knitting Machines—Full Fashioned)

FULLING (See also under individual headings: Penetrants, Wetting Agents, etc.)
Agents ..... A
Assistants ..... B
Emkay Chemical Co. ..... A, B
Standard Soap Div., Concord Chemical Co., ... A, B

FULLING MACHINES (See Mills—Fulling)

FULLING OILS (See Fulling Agents)

FUMARIC ACID (See Acids)

FUNGICIDES (See Mildew Preventives)

FUR—*Shuttle*
Batson Co., Louis P.
Morris Fur Co.
Snowiss Fur Co., B., Lock Haven, Pa.

GARNETT WIRE (See Card Clothing)

GARNETTING MACHINES
Proctor & Schwartz, Inc.

GASSING MACHINES (See Singeing Machines)

GATES—*Fence* (See Fencing)

GAUGES (See Instruments of all types)

GEARMOTORS (See Motors—Gear)

GEARS
Coiler (See Gears—Metal Gears & Pinions)
Draft (See Gears—Metal Gears & Pinions)
Metal Gears & Pinions ..... A
Non-metallic Gears & Pinions ..... B
Kluttz Machine & Foundry ..... A
Continental Diamond Fibre Corp. ..... B
Dixon Corp. ..... A
Engineered Plastics, Inc ..... B
Ferguson Gear Co. ..... A, B
National Vulcanized Fibre Co., Kennett Div. ..... B
Perfecting Service Co. ..... A, B
B. F. Perkins & Son, Inc. ..... A
Saco-Lowell Shops ..... A, B

GELATIN
Polymer Industries

GERMICIDES (See Antiseptics)

GIGS
Gessner Co., David
Riggs & Lombard Co.

GILL BOXES
Societe Alsacienne de Constructions Mechaniques, Mulhouse, France—Rep. in U.S.A. by Atkinson, Haserick & Co.

GILL REDUCERS (See Pin Drafters and Gill Reducers)

GLASS-FABRIC MACHINERY
Andrews & Goodrich Div. of Midland-Ross Corp.

GLUES (See Adhesives)

GLYCERIN (Glycerol)
Harshaw Chemical Co.

GREASES—*Lubricating* (See Lubricants—Oils & Greases)

GRIDS—*Card*
Davis & Furber Machine Co.
Saco-Lowell Shops

GRINDERS
Card, Garnett and Napper ..... A
Drum ..... B
Indigo C
Picker ..... D
Roll ..... E
Shear ..... F
Traverse ..... G
Booth Co., Benjamin ..... A
Davis & Furber Machine Co. ..... A, G
Riggs & Lombard Co. ..... E
Roy & Son, B. S. ..... A, B, C, D, E, F, G
Saco-Lowell Shops ..... A, B, G

GUIDERS
Batson Co., Louis P.
Butterworth & Sons Co., H. W.
Guider Specialty Co.
Mt. Hope Machinery Co.
Riggs & Lombard Co.

GUIDES
Cloth ..... A
Fiber-Knife & Steel ..... B
Pigtail (See Guides—Thread)
Roving & Sliver C
Selvage Uncurling ..... D
Spooler (See Guides—Thread)
Tenter-Clip Rail ..... E
Thread ..... F
Yarn (See Guides—Thread)
ALSIMAG—See American Lava Corp.
American Lava Corp., Titania Div. ..... C, F
Birch Bros., Inc. ..... A, D
Butterworth & Sons Co., H. W. ..... A, D, E
Engineered Plastics, Inc. ..... B, C
G. P. E. Controls, Inc. ..... A, E
Guider Specialty Co. ..... A
Industrial Sapphire Co. ..... F
Ives Co., Loyal T. ..... F
Mt. Hope Machinery Co. ..... A, D, E
Marshall & Williams Corp. ..... E
Saco-Lowell Shops ..... C, F

GUMS
Arabic ..... A
British ..... B
Carob C
Cellulose ..... D
Karaya ..... E
Senegal ..... F

FOR ADVERTISING PAGE NUMBERS AND ADDRESSES SEE PG. 223

Synthetic ..... G
Tragacanth ..... H
Vegetable I

Emkay Chemical Co. ..... A, B, C, D, E, F, G, H, I
Polymer Industries ..... C, I
Siddall Co., Inc., Geo. F. I
Staley Mfg. Co., A. E. ..... B, I

HACK STANDS

Cocker Machine & Foundry Co.
Davis & Furber Machine Co.

HAIR-PROCESSING MACHINERY

Curlator Corp.
Davis & Furber Machine Co.
Harwood & Son, Geo. S.
Proctor & Schwartz, Inc.
Sargent's Sons Corp. C. G.

HAMPERS (See Baskets—Canvas)

HANGERS—*Shaft* (see Blocks—Hanger & Pillow)

HANK CLOCKS (See Counters—Yarn-Yardage)

HANK COUNTERS (See Counters—Yarn-Yardage)

HARNESS FRAMES & HEDDLES

Batson Co., Louis P.

HEADS—*Balling* (See Balling Heads)

HEADS—*Beam* (See Beams & Beam Heads)

HEADS—*Cylinder*

Cocker Machine & Foundry Co.

HEADS— *Spray* (See Nozzles—Spray)

HEADS—*Worsted Balling* (See Balling Heads)

HEAT EXCHANGERS

Allen Son's Co., Wm., Div. O. G. Kelley & Co.
Lanly Co.

HEATERS (See also Dryers)

Feed Water ..... A
Gas-Fired ..... B
High-Frequency (See Dryers—High-Frequency or Infrared)
Unit C
Water ..... D

Johnson Corp. ..... A, D
Lanly Co. ..... B
Wiegand Co., Edwin L. ..... C, D

HEDDLES (See Harness Frames & Heddles)

HEMMING MACHINES (See Sewing Machines)

HOLDERS

Bobbin ..... A
Cone (See Holders—Bobbin)
Cop (See Holders—Bobbin)
Rayon-Cake ..... B
Ring (See Rings—Spinning & Twister)

Batson Co., Louis P. ..... A, B

HOODS—*Fume & Vapor*

Bahnson Co., The
Cocker Machine & Foundry Co.
Textile Shops

HOOKS

Harness, Reed & Shuttle ..... A
Sinker (See Sinkers & Dividers)
Welt ..... B

Batson Co., Louis P. ..... A
Ives Co., Loyal T. ..... B

HOSE—*Air & Water*

Lincoln Engineering Co.

HOSIERY BOARDING & PREBOARDING MACHINES

Turbo Machine Co.
Proctor & Schwartz, Inc.

HOSIERY FORMS

Drying ..... A
Examining ..... B

Engineered Plastics, Inc. ..... B
Textile Machine Works ..... B
Turbo Machine Co. ..... A

HUMIDIFIERS—*Room* (See also Air Conditioners)

Bahnson Co.

HUMIDIFYING CABINETS (See Cabinets—Humidifying)

HYDRAULIC POWER UNITS (See Power Units—Hydraulic & Pneumatic)

HYDROCHLORIC ACID (See Acids)

HYDROGEN PEROXIDE

Albone—See du Pont de Nemours & Co., Electrochemicals Dept.
du Pont de Nemours & Co., Inc., E. I., Electrochemicals Dept.

HYDROMETERS (See Instruments)

HYGROMETERS (See Controls—Humidity, or Instruments—Humidity, Indicating & Recording, or Instruments—Wet-Bulb Hygrometers)

HYDROSCOPIC AGENTS

Emkay Chemical Co.
Moretex Chemical Products, Inc.

IMPREGNATING MACHINES

Birch Bros., Inc.
Gessner Co., David
Hunt Machine Co., Rodney
Lanly Co.

INDICATORS (See Instruments of All Types)

INFRARED BURNERS (See Dryers—Infrared)

INHIBITORS—*Gas-Fading*

Emkay Chemical Co.

INKS & MARKING COMPOUNDS—Stamping & Indelible

Nissen Co., John P., Jr.
Riggs & Lombard Co.
Textile Adjuncts Corp.

INSECTICIDES

General Chemical Div., Allied Chemical Corp.

INSPECTION MACHINES

Birch Bros., Inc.
Riggs & Lombard Co.
Utica Novelty & Mill Specialty Co.

INSTRUMENTS

Static Indicator ..... A
Temperature, Indicating & Recording ..... B
Testing (see Testers)

Custom Scientific Instrument, Inc. ..... A
Wiegand Co., Edwin L. ..... B

ION EXCHANGERS & EQUIPMENT (See Water Treatment)

JACKS—Knitting Machines (See Sinkers & Dividers)

JACQUARD HARNESS (See Harness & Heddles)

JACQUARD COMBER BOARDS

Batson Co., Louis P.

JACQUARD HEADS & EQUIPMENT

Batson Co., Louis P.

J-BOXES

Birch Bros., Inc.
Butterworth & Sons Co., H. W.
Dalton Sheet Metal, Inc.
Hunt Machine Co., Rodney
Mt. Hope Machinery Co.
McKiernan-Terry Corp., Textile Machinery Div.
National Drying Machine Co., Inc.
Riggs & Lombard Co.
Societe Alsacienne de Constructions Mechaniques, Mulhouse, France—Rep. in U.S.A. by Atkinson, Haserick & Co.
Textile Shops

JIGS (See Dyeing Machines—Jig)

JOINTS

Expansion ..... A
Revolving ..... B

Perfecting Service Co. ..... B
Rotary Union—See Perfecting Service Co.
Rotherm Engineering Co., Inc. ..... A, B

JUTE-PROCESSING MACHINES (See Cordage Machines)

KETTLES

Corrosion-Resisting ..... A
Dye (See Kettles—Corrosion-Resisting, or Dyeing Machines—Piece Goods, Reel)
Mixing ..... B
Size C

Carroll & Co., J. E. ..... A, B, C
Cocker Machine and Foundry Co. ..... B, C
Hunt Machine Co., Rodney ..... B
Riggs & Lombard Co. ..... A, B, C
Societe Alsacienne de Constructions Mechaniques, Mulhouse, France—Rep. in U.S.A. by Atkinson, Haserick & Co. C
Textile Shops ..... A, B

KIER—BOILING AGENTS & ASSISTANTS

Emkay Chemical Co.
General Chemical Div., Allied Chemical Corp.
Moretex Chemical Products, Inc.
Rohm & Haas Co., Inc.
Textile Shops

KIERS—*Bleaching*

Allen Son's Co., Wm., Div. O. G. Kelley & Co.
Allen-Worcester—See Allen Son's Co., Wm., Div. O. G. Kelley & Co.
Societe Alsacienne de Constructions Mechaniques, Mulhouse, France—Rep. in U.S.A. by Atkinson, Haserick & Co.

KNITTING MACHINE ATTACHMENTS

Carolina Knitting Machine Co.
Supreme Knitting Machine Co., Inc.

KNITTING MACHINES

Circular ..... A
Circular Hosiery ..... B
Flat C
Full-Fashioned Hosiery ..... D
Full-Fashioned Sweaters ..... E
Hand ..... F
Jacquard ..... G
Links & Links Circular ..... H
Links & Links Flat I
Milanese ..... J
Netting ..... K
Raschel L
Ribbers ..... M
Seamless ..... N
Tricot ..... O

Carolina Knitting Machine Co. ..... A, B, C, D, E, F, H, I, J, N, O
Ordinance Gauge Co. ..... A
Reiner, Inc., Robert ..... C, D, E, G, K, L, O
Supreme Knitting Machine Co., Inc ..... A, G, M
Tompkins Bros. Co. ..... A
Textile Machine Works ..... B, D, E, O

KNIVES—*Machine*

Birch Bros., Inc.

KNOCK-OVER BITS (See Sinkers & Dividers)

KNOTTERS

Riggs & Lombard Co.

LABORATORY EQUIPMENT (See Testers)

LABORATORIES—*Testing*

Emkay Chemical Co.
South Florida Test Service
Thomason Textile Service, Inc.

LACE—MACHINE PARTS

Ives Co., Loyal T.

LACTIC ACID (See Acids)

LADDERS (See Scaffolds & Ladders)

LAGS—*Picker*

Proctor & Schwartz, Inc.
Saco-Lowell Shops

LAMPS—*Infrared* (See Dryers—Infrared)

LAPPERS

Sliver ..... A
Ribbon ..... B

Saco-Lowell Shops ..... A, B

LATCH NEEDLES (See Needles—Latch)

LATEX

Emkay Chemical Co.
Firestone Synthetic Rubber & Latex Co.

LAYERS—*Rope* (See Cordage Machines)

LEAD—*Salts of*

Acetate ..... A
Nitrate ..... B
Oxide (Litharge) C
Sulfate ..... D

General Chemical Div., Allied Chemical Corp. ..... A, B
Harshaw Chemical Co. ..... A, B, C, D

LEASE RODS (See Rods—Lease)

LEATHERS—*Textile* (See Aprons—Rub, or Aprons—Long Draft, or Covering—Leather Roll, Pickers—Loom or Tape Condensers)

LEASING MACHINES

Batson Co., Louis P.

FOR ADVERTISING PAGE NUMBERS AND ADDRESSES SEE PG. 223

LET-OFFS—*Warp & Cloth*
Birch Bros., Inc.
Marshall & Williams Corp.
Mt. Hope Machinery Co.
Reiner, Inc., Robert
Riggs & Lombard Co.

LICKERS-IN
Booth, Benjamin Co.
Saco-Lowell Shops

LINERS—*Basket, Box, Case, Drum*
Batson Co., Louis P.

LINGOES—*Jacquard*
Batson Co., Louis P.

LININGS—*Tank* (Corrosion-Resisting)
Allen Son's Co., Wm., Div. O. G. Kelley & Co.
Industrial Coatings, Inc.
Riggs & Lombard Co.

LINSEED OIL (See Oil—Natural)

LOADERS—*Kier* (See Pilers—Kier)

LOCUST-BEAN GUM (See Gums—Carob)

LOOMS—Cotton
Societe Alsacienne de Constructions Mechaniques, Mulhouse, France—Rep. in U.S.A. by Atkinson, Haserick & Co. C

LOOM PARTS—*Metallic & Non-Metallic*
Batson Co., Louis P.
Engineered Plastics, Inc.

LOOM REPAIR & REBUILDING
Batson Co., Louis P.

LOOM SIGNALING DEVICES
Batson Co., Louis P.

LOOP-CUTTING MACHINES (See Cutters)

LOOPERS—Sewing
Birch Bros., Inc. C

LUBRICANTS
Fiber & Yarn ..... A
Oils & Greases ..... B
Alemite Div., Stewart-Warner Corp. ..... B
Emkay Chemical Co. ..... A, B
Georgia-Carolina Oil Co.
G-C—See Georgia-Carolina Oil Co.
Ben Boy—See Georgia-Carolina Oil Co.
Moretex Chemical Products, Inc. ..... A
Polymer Industries

LUBRICATORS
Air ..... A
Flat Card Chain ..... B
Machine C
Stock ..... D
Alemite Div., Stewart-Warner Corp. C
Harwood & Son, Geo. S. ..... D
Jarrell-Bullard Co. ..... B
Lincoln Engineering Co. C
Perfecting Service Co. ..... A

LUBRICATING SYSTEMS
Bullneck—See Lincoln Engineering Co.
Centr Oiler—See Lincoln Engineering Co.
Centr-O-Luber—See Lincoln Engineering Co.
Centr-O-matic—See Lincoln Engineering Co.
Lincoln Engineering Co.
Multi-Luber—See Lincoln Engineering So.

LUMPERS—*Wool*
Davis & Furber Machine Co.

LUSTERING MACHINES
Gessner Co., David
Riggs & Lombard Co.
Turbo Machine Co.

LUSTRANTS & RELUSTRANTS
Emkay Chemical Co.
Moretex Chemical Products, Inc.

MACHINE-SHOP EQUIPMENT & SUPPLIES
Batson Co., Louis P.

MAGNIFIERS (See Glasses—Magnifying)

MALT (See Desizing Agents)

MANGLES
Birch Bros., Inc.
Butterworth & Sons Co., H. W.
Cocker Machine & Foundry Co.
McKiernan-Terry Corp., Textile Machinery Div.
Riggs & Lombard Co.

MANTLES—*Steaming* (See Decating Machines)

MARKING MACHINES
Batson Co., Louis P.
Reiner, Inc., Robert
Riggs & Lombard Co.

MARKING TUBES—*Dye & Bleach Resist*
Jiffy Textile Marker Co.
Nissen Co., John P., Jr.

MEASURING MACHINES (See also Counters)
Birch Bros., Inc.
Gessner Co., David
Reiner, Inc., Robert
Riggs & Lombard Co.

MENDING MACHINES
Birch Bros., Inc.

MERCERIZING ASSISTANTS
Emkay Chemical Co.
Moretex Chemical Products, Inc.

MERCERIZING MACHINES
Butterworth & Sons Co., H. W.
Hunt Machine Co., Rodney
Marshall & Williams Corp.
McKiernan-Terry Corp., Textile Machinery Div.
Riggs & Lombard Co.

METERS (See Instruments or Counters)

MICROSCOPES (See Glasses—Magnifying & Pick)

MILANESE MACHINES (See Knitting Machines—Milanese)

MILDEW PREVENTIVES
Emkay Chemical Co.
Harshaw Chemical Co.
Textile Adjuncts Corp.

MILLS
Fulling (Rotary) ..... A
Kicker ..... B
Pusher (See Mills-Kicker)
Riggs & Lombard Co. ..... A, B

MINERAL OILS (See Lubricants—Oils & Greases)

MIXERS—Dye (See Mixers—Mechanical)

MIXERS—*Mechanical*
Cocker Machine and Foundry Co.
Mixing Equipment Co.
Mixco—See Mixing Equipment Co.
Lightnin—See Mixing Equipment Co.

MOIRE MACHINES (See Calenders)

MOISTENERS (See Dewing Machines or Humidifiers)

MOLD PREVENTIVES (See Mildew Preventives)

MOPS—*Industrial Cleaning* (See Brushes)

MORDANT DYES (See Dyes—Mordant)

MOTIONS—*Builder* (See Roving Frames or Spinning Frames)

MOTOR-FREIGHT SERVICE (See Trucking Service)

MORDANTS
Emkay Chemical Co.
General Chemical Div., Allied Chemical Corp.

MOTE KNIVES
Saco-Lowell Shops

MOTHPROOFING AGENTS
Emkay Chemical Co.
Textile Adjuncts Corp.
Verona Dyestuffs

MOTORS—*Spinning Frame*
Davis & Furber Machine Co. ..... G

MURIATIC ACID (See Acids—Hydrochloric)

NAPHTHALENE (See Mothproofing Agents)

NAPHTHOL COLORS (See Dyes)

NAPPER CLOTHING
Booth Co., Benjamin
Davis & Furber Machine Co.

NAPPERS
Davis & Furber Machine Co.
Gessner Co., David
Riggs & Lombard Co.
Woonsocket Napping Machinery Co.

NEBS—*Lubricating* (See Saddles & Nebs—Lubricating)

NEEDLE BARS
Saco-Lowell Shops
Textile Machine Works

NEEDLE REPAIR
Textile Machine Works

NEEDLES
Latch ..... A
Sewing Machine ..... B
Spring Board C
Birch Bros., Inc. ..... B
Ives Co., Loyal T. C
Textile Machine Works ..... A, C

NITER CAKE (See Sodium—Salts of—Bisulfate)

NITRIC ACID (See Acids)

NONWOVEN FABRIC MACHINES (See also Web-Forming Machines)
Andrews & Goodrich Div. of Midland-Ross Corp.
Curlator Corp.
Davis & Furber Machine Co.
B. F. Perkins & Son Inc.
Proctor & Schwartz, Inc.
Rando-Webber—See Curlator Corp.

NOZZLES—*Spray*
Bahnson Co.
Parks-Cramer Co.

NUTS (See Fasteners)

NYLON (POLYAMIDE) YARNS & FIBERS (See Yarns & Fibers)

ODOR-MASKING AGENTS
Emkay Chemical Co.
Moretex Chemical Products, Inc.
Textile Adjuncts Corp.

OIL—*Fiber Process*
Boil-Off ..... A
Rayon ..... B
Sulfonated Oils & Fats C
Turkey Red ..... D
Wool ..... E
Emkay Chemical Co. ..... A, B, C, D, E
Polymer Industries ..... B, C
Siddall Co., Inc., Geo. F. ..... B, C
Moretex Chemical Products, Inc. C
Standard Soap Div., Concord Chemical Co. ..... A, F
Tennessee Corp. C

OIL—*Lubricating* (See Lubricants—Oils & Greases)

OIL—*Natural*
Castor ..... A
Coconut ..... B
Pine C
Emkay Chemical Co. C

OIL
Non-Staining ..... A
Penetrating ..... B
Emkay Chemical Co. ..... B
Moretex Chemical Products, Inc. ..... A, B

OILERS—*Hand* & Mechanical (See Lubricators)

OLEIC ACID (See Acids—Fatty)

OPENERS
Cloth ..... A
Cotton ..... B
Spiral (See Openers—Cloth)
Man-Made Staple C
Tenter-Frame ..... D
Wool (See also Dusting Machines—Wool & Waste) ..... E
Waste (See Waste Machines)
Birch Bros., Inc. ..... A
Butterworth & Sons Co., H. W. ..... A, E
Dalton Sheet Metal, Inc. ..... D
Davis & Furber Machine Co. ..... A, C, E
Gessner Co., David ..... A
Marshall & Williams Corp. ..... D
Mt. Hope Machinery Co. ..... A
Riggs & Lombard Co. ..... A
Saco-Lowell Shops ..... B, C
Sargent's Sons Corp., C. G. ..... C, E
Societe Alsacienne de Constructions Mechaniques, Mulhouse, France—Rep. in U.S.A. by Atkinson, Haserick & Co. ..... B, D

OVENS
Conditioning, All Types ..... A
Laboratory ..... B
Andrews & Goodrich Div. of Midland-Ross Corp. ..... A, B
Riggs & Lombard Co. ..... A

FOR ADVERTISING PAGE NUMBERS AND ADDRESSES SEE PG. 223

1959 INDEX TO

OVER-FEED EQUIPMENT
Butterworth & Sons Co., H. W.
Marshall & Williams Corp.

OXALIC ACIDS (See Acids)

OXIDIZING AGENTS (See also under individual headings; Hydrogen Peroxide, Potassium, Permanganate, etc.)
du Pont de Nemours & Co., Inc., E. I., Electrochemicals Dept.
Emkay Chemical Co.
General Chemical Div., Allied Chemical Corp.

PACKAGING EQUIPMENT—*Yarn* (See also Wrapping Machines)
Turbo Machine Co.

PACKAGING MATERIALS—*Textile*
Sonoco Products Co.
Thilmany Pulp & Paper Co.

PADDERS (See Dyeing Machines—Padders)

PAILS (See Buckets & Dippers)

PAINT REMOVERS (See Tar & Paint Removers)

PALLETS & SKIDS
Excel Co., Inc.

PALMERS (See Shrinking Machines)

PAPER
Calender-Roll ..... A
Wrapping & Baling ..... B
Butterworth & Sons Co., H. W. ..... A
Thilmany Pulp & Paper Co. ..... B

PENETRANTS (See also Wetting Agents)
Emkay Chemical Co.
Moretex Chemical Products, Inc.
Polymer Industries
Rohm & Haas Co., Inc.
Textile Adjuncts Corp.

PERCHES (See Inspection Machines)

PEROXIDES (See Hydrogen Peroxide, or Sodium—Salts of—Peroxide)

PHENOL (See Acids—Carbolic)

PHENYLEMTHYLPYRAZOLONE (See Developers)

PHOSPHATES (See under individual headings; Calcium, Potassium, Sodium—Salts of, etc.)

PHOSPHORIC ACID (See Acids)

PICK CLOCKS (See Counters—Loom-Pick)

PICKER PARTS
Batson Co., Louis P.
Davis & Furber Machine Co.
Proctor & Schwartz, Inc.
Perfecting Service Co.
Sargent's Sons Corp., C. G.

PICKERS
Burr ..... A
Cotton ..... B
Fearnaught C
Loom ..... D
Mixing ..... E
Rag & Shoddy ..... F
Batson Co., Louis P. ..... D
Davis & Furber Machine Co. ..... A, C, E, F
Proctor & Schwartz, Inc. ..... E, F
Saco-Lowell Shops ..... B
Sargent's Sons Corp., C. G. ..... A, E

PIGMENTS
Dyeing & Binders ..... A
Printing & Binders ..... B
Carbic Hoechst Corp. ..... A, B
General Dyestuff Co., Sales Div., General Aniline & Film Corp. ..... B
Harshaw Chemical Co. ..... A, B
Hostatone—See Carbic Hoechst Corp.
Hosatex—See Carbic Hoechst Corp.
Hostaperm—See Carbic Hoechst Corp.
Imperon—See Carbic Hoechst Corp.
Polymer Industries ..... A, B
Verona Dyestuffs ..... A, B

PILERS
Bin ..... A
Kier ..... B
Cocker Machine and Foundry Co. ..... A, B
B. F. Perkins & Son, Inc. ..... A

PIN BOARDS (See Boards—Pin)

PIN DRAFTERS & GILL REDUCERS
Societe Alsacienne de Constructions Mechaniques, Mulhouse, France—Rep. in U.S.A. by Atkinson, Haserick & Co.

PINE OIL (See Oil—Natural)

PINIONS (See Gears & Pinions)

PINS—*Processing*
Fasteners (See Fasteners)
Fibre Binder ..... A
Tenter ..... B
Batson Co., Louis P. ..... A
Marshall & Williams Corp. ..... B

PIPE
Acid-Resisting Alloy ..... A
Asbestos-Cement ..... B
Corrosion-Resisting Alloy C
Nickel (See Pipe—Corrosion-Resisting Alloy)
Plastic Pipe & Fittings ..... D
Vitrified Clay ..... E
Batson Co., Louis P. C
Engineered Plastics, Inc. ..... D
Saco-Lowell Shops ..... A, B, E

PIRNS (See Bobbins)

PLAITING MACHINES
Birch Bros., Inc.
Carroll & Co., J. E.
Cocker Machine and Foundry Co.
Hunt Machine Co., Rodney
McKiernan-Terry Corp., Textile Machinery Div.
Marshall & Williams Corp.
Riggs & Lombard Co.
Sargent's Sons Corp., C. G.

PLASTIC COATING FOR MACHINE PARTS (See Commission Services)

PLASTICIZERS (See also Softeners)
Emkay Chemical Co.
Rohm & Haas Co., Inc.

PLASTICS & RESINS
Acrylics ..... A
Alkyds ..... B
Cellulosics (Acetate, Nitrate, etc.) C
Formaldehyde (Melamine, Phenolic, Urea) ..... D
Polyethylene ..... E
Protein ..... F
Styrenes ..... G
Tetrafloroethylene ..... H
Vinyl & Polyvinyl I
Batson Co., Louis P. ..... E, G, I
du Pont de Nemours & Co., Inc., E. I., Electrochemicals Dept. I
Elvacet—See du Pont de Nemours & Co., Electrochemicals Dept.
Engineered Plastics, Inc. ..... A, C, D, E, G, H, I
Emkay Chemical Co. ..... B, D, F
Industrial Coatings Inc. ..... H
Monsanto Chemical Co., Plastics Div. ..... C, D, E, G, I
Polymer Industries ..... A, D, I
Rohm & Haas Co., Inc. ..... A, D
Teflon—See Industrial Coatings, Inc.

PLASTICS & RESINS—*Extrusions & Mouldings*
Engineered Plastics, Inc.

PLATES—*Heating & Cooling* (Steel or Stainless Steel—See Steel)
Wiegand Co., Edwin L.

POINTS
Full-Fashioned Narrowing & Picot ..... A
Transfer ..... B
Ives Co., Loyal T. ..... B
Reiner, Inc. ..... A, B
Textile Machine Works ..... A, B

POLES—*Drying*
Batson Co., Louis P.

POLISHERS—*Floor* (See Floor Cleaning, Sanding, Scrubbing & Polishing, etc.)

POLYESTER YARNS & FIBERS (See Yarns & Fibers)

POTASSIUM—*Salts of*
Acetate ..... A
Cyanide ..... B
du Pont de Nemours & Co., Inc., E. I., Electrochemicals Dept. ..... B
General Chemical Div., Allied Chemical Corp. ..... A

POTATO STARCH (See Starches—Natural)

POTENTIOMETERS—*Recording* (See Instruments—Temperature Indicating & Recording)

POT-EYES
Ceramic ..... A
Metal ..... B
Synthetic C
American Lava Corp., Titania Div. ..... A
Batson Co., Louis P. ..... B
Birch Bros., Inc. ..... B
Engineered Plastics, Inc. C
Hunt Machine Co., Rodney ..... B
Industrial Coatings, Inc. C
Mt. Hope Machinery Co. ..... B
McKiernan-Terry Corp., Textile Machinery Div.
Riggs & Lombard Co. ..... B
Textile Shops ..... B

POWER UNITS—*Hydraulic & Pneumatic*
B. F. Perkins & Son Inc.

PREBOARDING MACHINES (See Hosiery Boarding & Preboarding Machines)

PRESSES—*Baling* (See Baling Presses)

PRESSING MACHINES—*Cloth*
Gessner Co., David
Utica Novelty & Mill Specialty Co.

PRINTING ASSISTANTS (See under individual headings; Gums, Dextrin, Penetrants, Reducing Agents, Starches, etc.)

PRINTING MACHINES
Butterworth & Sons Co., H. W.
Reiner, Inc., Robert
Printing Thickeners (See also under Dextrin, Gums, Starches, etc.)
Polymer Industries

PULLERS—*Cloth*
Birch Bros., Inc.
Johnson Corp.
Mc-Kiernan-Terry Corp., Textile Machinery Div.
Mt. Hope Machinery Co.

PULLEYS
Clutch (See Clutches—Friction)
Iron, Steel, Wood & Ceramic ..... A
Variable-Speed Motor ..... B
Tape Tension C
American Lava Corp., Titania Div. ..... A
Roy & Son, B. S. ..... B
SKF Industries, Inc. C

PUMPS
Boiler Feed ..... A
Centrifugal ..... B
Corrosion-Resistant C
Deep Well (See Pumps—Centrifugal)
Piston & Plunger ..... D
Sump (See Pumps—Centrifugal)
Turbine Type (See Pumps—Centrifugal)
Allen Son's Co., Wm., Div. O. G. Kelley & Co. ..... B
Johnson Corp. ..... A
Lincoln Engineering Co. ..... C, D
Logemann Bros. Co. ..... C, D

PURIFIERS—*Water* (See also Water Treatment—Water Softening Equipment)
Emkay Chemical Co.
Tennessee Corp.

PYROLIGNITE OF IRON (See Ferrous & Ferric—Salts of)

PYROMETERS (See Instruments—Temperature Indicating & Recording)

QUENCH BOXES (See Tanks)

QUALITY CONTROL
Thomason Textile Service, Inc.

QUETSCHES
Birch Bros., Inc.
Carroll & Co., J. E.
Cocker Machine & Foundry Co.
Gessner Co., David
Riggs & Lombard Co.
Textile Shops

QUICK-DISCONNECTS
Perfecting Service Co.
Pushomatic—See Perfecting Service Co.

QUILL-POLISHING MACHINES
Reiner, Inc., Robert

QUILLERS (See Winders—Filling)

QUILLS (See Bobbins)

RAG DYEING MACHINES (See Dyeing Machines—Raw Stock)

FOR ADVERTISING PAGE NUMBERS AND ADDRESSES SEE PG. 223

RAG PICKERS (See Pickers—Rag & Shoddy)

RAISING MACHINES (See Nappers)

RANGES—*Splitting & Extracting* (Knit Goods)
Birch Bros., Inc.

RANGES
Bleaching (See Bleaching Machines)
Carbonizing (See Carbonizers—Piece Goods)
Dyeing (See Dyeing Machines—Piece Goods)
"Sanforized" (See "Sanforized" Machines)

RAYON OILS (See Oils—Fiber Process)

RAYON SIZINGS (See Sizing Agents)

RAYON (REGENERATED CELLULOSE) YARNS & FIBERS (See Yarns & Fibers)

RECORDERS (See Instruments of all Types)

RED OIL (See Acids—Fatty, Oleic)

RED PRUSSIATE (See Potassium—Salts of)

"REDMANIZED" EQUIPMENT
Proctor & Schwartz, Inc.

REDUCERS—*Speed* (Gear—See Motors—Gear; Worsted—See Roving Frames—Worsted)
Ferguson Gear Co.
Stephens-Adamson Mfg. Co.

REDUCING AGENTS
Emkay Chemical Co.
Rohm & Haas Co., Inc.
Tennessee Corp.

REEDS—*Lease, Loom, Metal or Pitch Band* (Expansion—See Combs—Expansion)
Cocker Machine and Foundry Co.

REELS—*Bleaching & Dyeing*
Bleaching & Dyeing ..... A
Dresser ..... B
Inspection (See Perches)
Skeining (See also Winders—Skein) C
Birch Bros., Inc. ..... A
Butterworth & Sons Co., H. W. ..... A
Davis & Furber Machine Co. ..... B
Hunt Machine Co., Rodney ..... A
McKiernan-Terry Corp., Textile Machinery Div. ..... A
Riggs & Lombard Co. ..... A
Scott Testers, Inc. C

RELAYS (See Controls—Automatic & Manual Motor)

REGULATORS
Air ..... A
Condenser Water (See Controls—Fluid-Flow)
Humidity (See Controls—Humidity)
Motor Speed (See Controls—Automatic & Manual)
Pressure (See Controls—Pressure & Vacuum)
Rate-of-Flow (See Controls—Fluid-Flow)
Slasher Roll Pressure ..... B
Temperature (See Controls—Temperature)
Vacuum (See Controls—Pressure & Vacuum)
Cocker Machine and Foundry Co. ..... B
Perfecting Service Co. ..... A
Universal Air—See Perfecting Service Co.

RE-ROLLING MACHINES
Birch Bros., Inc.
Riggs & Lombard Co.
Utica Novelty & Mill Specialty Co.

RESEARCH (See Engineering Services & Consultants)

RESIN FINISHES (See Plastics & Resins)

RESIN-CURING MACHINES
Andrews & Goodrich Div. of Midland-Ross Corp.
Proctor & Schwartz, Inc.

RETARDING AGENTS
Emkay Chemical Co.
Polymer Industries

REVOLVING OR ROTARY JOINTS (See Joints—Revolving)

REWETTING AGENTS (See Wetting Agents)

REWINDERS (See Backwinders, or Winders—Cloth)

RHEOSTATS—*Speed Regulating* (See Controls—Automatic & Manual Motor)

RIBBERS (See Knitting Machines—Ribbers)

RIBBON LAPPERS (See Lappers—Ribbon)

RICE STARCH (See Starch—Natural)

RING-DOFFER CONDENSERS
Davis & Furber Machine Co.

RINGS—*Spinning & Twister*
Davis & Furber Machine Co.
Kluttz Rings Inc.
National Vulcanized Fibre Co., Lestershire Div.
Ragan Ring Co.
Saco-Lowell Shops

RINGS—*Guide* (See Guides—Thread)

RINGS—*Hydraulic* (See Packing—Rubber, Fiber, Metallic, Spiral & Ring

RODS
Corrosion-Resisting (See Steel—Corrosion-Resisting)
Lap ..... A
Lease ..... B
Lifter C
Split (See Rods—Lease)
Welt (See Hooks—Welt)
Batson Co., Louis P. ..... B, C
Engineered Plastics, Inc. ..... B
Gastonia Roller, Flyer & Spindle Co. C
Saco-Lowell Shops ..... A, C

ROLL STANDS
Batson Co., Louis P.
Dixon Corp.
Gastonia Roller, Flyer & Spindle Co.
Hunt Machine Co., Rodney
Mt. Hope Machinery Co.
Saco-Lowell Shops

ROLLS
Brush ..... A
Calender ..... B
Clearer (See Clearers—Flat & Revolving)
Cloth C
Crush ..... D
Doffer ..... E
Drawing, Roving & Spinning ..... F
Embossing (See Rolls—Calender)
Fabric Transit (See Cores)
Feed (See Feeders—Continuous Roll)
Finishing ..... G
Fluted ..... H
Fulling I
Guider ..... J
Lap ..... K
Loom Cloth L
Printing ..... M
Roving (See Rolls—Drawing, Roving & Spinning)
Rubber-Covered ..... N
Scavenger ..... O
Shell (See Rolls—Drawing, Roving & Spinning)
Spinning (See Rolls—Drawing, Roving & Spinning)
Steam-Heated, Cooling ..... P
Squeeze (See Quetches)
Temple (See Temples—Loom)
Top (See Rolls—Drawing, Roving & Spinning)
Twisting-Machine ..... Q
Warper & Slasher ..... R
Andrews & Goodrich Div. of Midland-Ross Corp.
Batson Co., Louis P. ..... C, F, K, L, N, O
Birch Bros., Inc. ..... A, B, G, N
Butterworth & Sons Co., H. W. ..... B, J, M, N
Carroll & Co., J. E. ..... C, G, N
Cocker Machine & Foundry Co. ..... N, R
Dixon Corp. ..... F
Gastonia Roller, Flyer & Spindle Co. ..... B, F, H, Q
Gessner Co., David ..... A, C, G
Hunt Machine Co., Rodney ..... C, E, F, G, H, I, N
Industrial Coatings Inc. ..... G, L, R
Jenkins Sons, M. W. ..... A, N
Livingston & Haven, Inc. ..... B
McKiernan-Terry Corp., Textile Machinery Div. ..... B, N, P
Mt. Hope Machinery Co. ..... J, N
B. F. Perkins & Son Inc. ..... A, B
Reiner, Inc., Robert ..... R
Riggs & Lombard Co. ..... I, N
Saco-Lowell Shops ..... F, K, O, Q, R
Sargent's Sons Corp., C. G. ..... D, E
Shaftite—See Hunt Co., Rodney
Textile Shops ..... N, R
Universal Winding Co. ..... Q

ROPE MACHINES
Riggs & Lombard Co.

ROPE—*Mule* (See Bands—Mule, Spinning & Twisting

ROVING FRAMES
Saco-Lowell Shops
Societe Alsacienne de Constructions Mechaniques, Mulhouse, France—Rep. in U.S.A. by Atkinson, Haserick & Co.

RUB APRONS (See Aprons—Rub)

SADDLES & NEBS
Lubricating ..... A
Non-Lubricating ..... B
Batson Co., Louis P. ..... A, B
Dixon Corp. ..... A, B

"SANFORIZED" ASSISTANTS
Emkay Chemical Co.
Moretex Chemical Products, Inc.

"SANFORIZED" MACHINES
Butterworth & Sons Co., H. W.

SATURATING MACHINES (See Impregnating Machines)

SCHIFFLI MACHINES (See Embroidering Machines)

SCOURING AGENTS (See under individual headings; Detergents, Soaps, Wool—Scouring Agents, etc.)

SCAFFOLDS & LADDERS—Portable
Excel Co., Inc.

SCOURING MACHINES
Cloth ..... A
Raw Stock ..... B
Yarn C
Birch Bros., Inc. C
Hunt Machine Co., Rodney ..... A
Proctor & Schwartz, Inc. ..... A
Riggs & Lombard Co. ..... A
Sargent's Sons Corp., C. G. ..... B, C
Textile Shops C

SCRAYS & CRADLES—*Cloth*
Birch Bros., Inc.
Cocker Machine & Foundry Co.
Gessner Co., David
Hunt Machine Co., Rodney
Riggs & Lombard Co.
Mt. Hope Machinery Co.
Textile Shops

SCREENS—*Card, Lickerin, Picker & Waste Machine*
Davis & Furber Machine Co.

SCREWS (See Fasteners)

SCROOPING AGENTS
Emkay Chemical Co.
General Chemical Div., Allied Chemical Corp.
Moretex Chemical Products, Inc.

SCUTCHERS—*Cloth* (See Openers—Cloth)

SCRUBBERS—*Floor* (See Floor Cleaning, Sanding, Scrubbing & Polishing Machines)

SEALERS
Carton (See Wire Stitching Machines)
Slot, Vacuum ..... A
Birch Bros., Inc. ..... A
Gessner Co., David ..... A

SEALS
Bale (See Strapping—Box & Carton)
Box (See Labels—Box & Carton)
Steel Strapping (See Strapping—Box & Carton)

SEAMERS (See also Sewing Machines)
Birch Bros., Inc.

SELVAGE-LOOP CUTTING MACHINES (See Cutters—Selvage-Loop)

SEMI-DECATING MACHINES (See Decating Machines)

SEPARATORS—*Air*
Air, Oil, Steam & Water ..... A
Centrifugal (See Extractors—Centrifugal)
Magnetic ..... B
Spinner C
Twister ..... D
Alemite Div., Stewart-Warner Corp. ..... A
Batson Co., Louis P. ..... B, C, D
Engineered Plastics, Inc. ..... C, D
Johnson Corp. ..... A
Perfecting Service Co. ..... A
Saco-Lowell Shops ..... C, D

FOR ADVERTISING PAGE NUMBERS AND ADDRESSES SEE PG. 223

SEQUESTERING AGENTS
Emkay Chemical Co.
General Chemical Div., Allied Chemical Corp.
Moretex Chemical Products, Inc.

SETTERS—*Twist* (See Twist Setters)

SETTERS—*Woven-Fabric* (See Tenter Frames—Cloth)

SEWING MACHINES
Birch Bros., Inc.
Coronation—See Birch Bros.
Excel—See Birch Bros.
Supreme—See Birch Bros.
Utica Novelty & Mill Specialty Co.

SHEARS
Carpet (See Shears—Rotary)
Mill (See Scissors & Shears—Mill)
Rotary ..... **A**
Riggs & Lombard Co. ..... A
Turbo Machine Co. ..... A

SHEAVES
Belt (See Drives—V-Belt)
V-Belt ..... **A**
Dodge Mfg. Corp. ..... A

SHELLS (See Rolls)

SHIELDS—*Bobbin & Drivers*
Batson Co., Louis P.
Textile Shield Co., Inc.

SHREDDERS (See Pickers—Rag & Shoddy)

SHRINKAGE CONTROL AGENTS
Moretex Chemical Products, Inc.

SHRINKING MACHINES (See also "Sanforized" Machines)
Gessner Co., David
Industrial Dryer Corp.
Proctor & Schwartz, Inc.
Reiner, Inc., Robert
Riggs & Lombard Co.

SHUTTLE FUR (See Fur—Shuttle)

SHUTTLES
Reiner, Inc., Robert
Morris Fur Co.

SINGEING MACHINES
Piece-Goods ..... **A**
Warp ..... **B**
Batson Co., Louis P. ..... A
Birch Bros., Inc. ..... A
Butterworth & Sons Co., H. W. ..... A
Cocker Machine & Foundry Co. ..... B
McKiernan-Terry Corp., Textile Machinery Div. ..... A
Riggs & Lombard Co. ..... A
Societe Alsacienne de Constructions Mechaniques, Mulhouse, France—Rep. in U.S.A. by Atkinson, Haserick & Co. ..... A

SINKERS & DIVIDERS
Ives Co., Loyal T.
Textile Machine Works

SIZE-PREPARATION APPARATUS
Cocker Machine & Foundry Co.
Siddall Co., Inc., Geo. F.
Societe Alsacienne de Constructions Mechaniques, Mulhouse, France—Rep. in U.S.A. by Atkinson, Haserick & Co.
Textile Shops

SIZERS—*Warp* (See Slashers)

SIZERS—*Yarn* (See Yarn-Sizing Machines)

SIZING AGENTS
du Pont de Nemours & Co., Inc., E. I., Electrochemicals Dept.
Emkay Chemical Co.
Monsanto Chemical Co., Plastics Div.
Moretex Chemical Products, Inc.
Polymer Industries
Rohm & Haas Co., Inc.
Siddall Co., Inc., Geo. F.

SKEIN-HANKING MACHINES (See Reels—Skeining)

SKEWERS
Parks Co., M. H.

SKIDS (See Pallets & Skids)

SLASHERS (See also Yarn-Sizing Machines)
Andrews & Goodrich Div. of Midland-Ross Corp.
Batson Co., Louis P.
Cocker Machine & Foundry Co.
Industrial Coatings Inc.
Proctor & Schwartz, Inc.
Saco-Lowell Shops
Textile Shops

SLATS—*Picker*
Saco-Lowell Shops
Sargent's Sons Corp., C. G.

SLITTERS—*Cloth*
B. F. Perkins & Son, Inc.
Utica Novelty & Mill Specialty Co.

SLIVER LAPPERS (See Lappers—Sliver)

SLUB CATCHERS
American Lava Corp., Titania Div.
Batson Co., Louis P.
Industrial Sapphire Co.
Parks-Cramer Co.
Universal Winding Co.

SLUBBING FRAMES
Ferguson Gear Co.

SOAKING AGENTS (See also Soaps, Lubricants, etc.)
Emkay Chemical Co.
Polymer Industries

SOAPERS—*Cloth & Yarn*
Birch Bros., Inc.
Butterworth & Sons Co., H. W.
McKiernan-Terry Corp., Textile Machinery Div.
Riggs & Lombard Co.

SOAPS—*Textile*
Emkay Chemical Co.

SODA ASH (See Sodium—Salts of—Carbonate)

SODIUM HYPOSULFATE (See Antichlors)

SODIUM—*Salts of*
Bifluoride ..... **A**
Bisulfate ..... **B**
Fluoborate ..... **C**
Fluoride ..... **D**
Formaldehyde Sulfoxylate ..... **E**
Hyrosulfite ..... **F**
Metasilicate ..... **G**
Perborate ..... **H**
Peroxide ..... **I**
Phosphate, Dibasic ..... **J**
Phosphate, Tribasic ..... **K**
Pyrophosphate ..... **L**
Silicate ..... **M**
Stannate ..... **N**
Sulfate (Glaubers Salt) ..... **O**
du Pont de Nemours & Co., Inc., E. I. Electrochemicals Dept. ..... H, I, N
General Chemical Div., Allied Chemical Corp. ..... A, B, C, D, G, J, K, L, M, O
Rohm & Haas Co., Inc. ..... E, F
Solozone—See du Pont de Nemours & Co. Electrochemicals Dept.
Tennessee Corp. ..... F

SOFTENERS—*Fabric* (See also Sulfonated Fatty Alcohols, etc.)
Emkay Chemical Co.
Polymer Industries
Rohm & Haas Co., Inc.
Siddall Co., Inc., Geo. F.
Textile Adjuncts Corp.

SOLENOIDS
Livingston & Haven, Inc.

SPINDLE-OILING MACHINES (See also Lubricators—Machine)
Saco-Lowell Shops

SPINDLES
Cotton ..... **A**
Rayon & Silk ..... **B**
Scavenger ..... **C**
Wool ..... **D**
Worsted ..... **E**
Batson Co., Louis P. ..... B, C
Davis & Furber Machine Co. ..... D
Gastonia Roller, Flyer & Spindle Co. ..... A, B, D, E
Hartford-Greenville Div., Standard Screw Co. ..... A, B, D, E
New Era—See Saco-Lowell Shops
Saco-Lowell Shops ..... A, B, D, E
Societe Alsacienne de Constructions Mechaniques, Mulhouse, France—Rep. in U.S.A. by Atkinson, Haserick & Co. ..... A, E
Spindles, Motors & Machines, Ltd, Switzerland—Rep. in U.S.A. by Gubelin International ..... A, B, C, D, E
Universal Winding Co. ..... B

SPINNING FRAMES
Cotton System ..... **A**
Wool ..... **B**
Worsted ..... **C**
Davis & Furber Machine Co. ..... B
Gwaltney—See Saco-Lowell Shops
Saco-Lowell Shops ..... A, B, C
Societe Alsacienne de Constructions Mechaniques, Mulhouse, France—Rep. in U.S.A. by Atkinson, Haserick & Co. ..... A, C

SPINNING FRAME SUPPLIES
Batson Co., Louis P.
Davis & Furber Machine Co.
Dixon Corp.

SPINNING OILS (See Lubricants—Fiber & Yarn)

SPLITTERS
Tubular Knit Goods ..... **A**
Warp (See Doublers—Warp & Splitters)
Birch Bros., Inc. ..... A
Utica Novelty & Mill Specialty Co. ..... A

SPOOLERS
Jack ..... **A**
Narrow-Fabric ..... **B**
Woolen & Worsted ..... **C**
Davis & Furber Machine Co. ..... A, C
Utica Novelty & Mill Specialty Co. ..... B

SPOOLS (See also Bobbins)
Carpet & Rug ..... **A**
Fibre ..... **B**
Jack ..... **C**
Lace ..... **D**
Metal (See also listings by use) ..... **E**
Ribbon ..... **F**
Thread ..... **G**
Wood (See also listings by use) ..... **H**
Batson Co., Louis P. ..... A, B, C, D, E, F, G, H
Engineered Plastics, Inc. ..... A, B, E, G
National Vulcanized Fibre Co. Lestershire Div. ..... B, C, E, H
North Waterford Spool Co. ..... D, H
Parks Co. ..... A, C, D, E, H
Sonoco Products Co. ..... B, D, G
Textile Shield Co., Inc. ..... E

SPOTPROOFING AGENTS
Polymer Industries

SPOTTING AGENTS
du Pont de Nemours & Co., Inc., E. I., Electrochemicals Dept.
Emkay Chemical Co.
Siddall Co., Inc., Geo. F.

SPRAYING MACHINES (See also Dewing Machines)

SPREADERS
Cloth-Expanding ..... **A**
Gill or Roll ..... **B**
Birch Bros., Inc. ..... A
Gessner Co., David ..... B
Jenkins Sons, M. W. ..... A
Mt. Hope Machinery Co. ..... A
Riggs & Lombard Co. ..... A
Utica Novelty & Mill Specialty Co. ..... A

SPRING-BEARD NEEDLES (See Needles—Spring-Beard)

SPROCKETS—*Chain*
Cocker Machine and Foundry Co.
Dodge Mfg. Corp.
Ferguson Gear Co.

SQUEEZERS—*Cloth* (See also Quetches)
Birch Bros., Inc.
Gessner Co., David
Hunt Machine Co., Rodney
McKiernan-Terry Corp., Textile Machinery Div.
Riggs & Lombard Co.

STAMPINGS—*Metal*
Batson Co., Louis P.
Textile Shield Co., Inc.

FOR ADVERTISING PAGE NUMBERS AND ADDRESSES SEE PG. 223

STANNIC CHLORIDE (See Tin—Salts of—Chloride)

STAPLERS (See Wire-Stitching Machines)

STARCH MANGLES (See Mangles—Cloth)

STARCHES (See also Gums—British Dextrin, etc.)

STARCHES—*Converted*
Staley Mfg. Co., A. E.

STARCHES—*Natural, Corn*
Clinton Corn Processing Co.
Staley Mfg. Co., A. E.

STARCHING MACHINES (See Dusting Machines—Coated Fabric)

STARTERS—*Motor* (See Controls—Automatic & Manual Motor)

STATIC ELIMINATORS—*Chemical* (See Anti-Static Agents)

STATIC NEUTRALIZERS & ELIMINATORS
American Lav. Corp., Titania Div.
Chapman—See Portland Co.
Emkay Chemical Co.
Portland Co.
Statkil, Inc.
Textile Adjuncts Corp.
Wiegand Co., Edwin L.

STEAMING MACHINES—*Knitted Cloth*
Riggs & Lombard Co.
Utica Novelty & Mill Specialty Co.

STEAMING MACHINES—*Mantle* (See Decating Machines)

STEAMING MACHINES—*Woven Cloth* (See Boxes Steamer; Dryers—Piece Goods; Decating Machines; Conditioners—Yarn)

STEARIC ACID (See Acids—Fatty)

STEEL (Including Alloys)—Plates (Floor etc.)
Acme Steel Co.

STIFFENING AGENTS
du Pont de Nemours & Co., Inc., E. I., Electrochemicals Dept.
Emkay Chemical Co.
Polymer Industries

STIRRERS (See Mixers—Mechanical)

STIRRUPS & LEVERS (See Saddles)

STITCHERS (See Wire-Stitching Machines)

STRAIGHTENERS—*Filling* (See Filling—Straightening Devices)

STOP-MOTIONS
Drop-Wire Electrical ..... **A**
Knockoff, Spoon, Mechanical ..... **B**
Adams, Inc. ..... A
Gastonia Roller, Flyer & Spindle Co. ..... B
Reiner, Inc., Robert ..... A

STRANDING MACHINES (See Cordage Machines or Strapping Machines—Wire)

STRAPPING—*Box & Carton*
Acme Steel Co.
Allegheny Steel Band Co.

STRETCHERS
Bristle ..... **A**
Cloth-Belt ..... **B**
Birch Bros., Inc. ..... A, B

STRIPPERS—*Card*
Saco-Lowell Shops

STRIPPING AGENTS (See also under individual headings; Sodium—Salts of, etc.)
Emkay Chemical Co.
Rohm & Haas Co., Inc.

SUGAR OF LEAD (See Lead—Salts of—Acetate)

SULFONATED FATTY ALCOHOLS (See Fatty Alcohol Sulfates of Emulsifying Agents)

SULFONATED OILS (See Oils—Fiber Process)

SUEDING MACHINES
Reiner, Inc., Robert

SULFUR
General Chemical Div., Allied Chemical Corp.

SULFUR DIOXIDE (See Antichlors)

SULFUR DYES (See Dyes)

SULFURIC ACID (See Acids)

SULFUROUS ACID (See Antichlors or Acids)

SWEEPSTICKS (See Sticks—Picker)

SWIFTS (See Bobbins—Bottle, or Reels—Skeining)

TABLES
Burling ..... **A**
Feed ..... **B**
Inspection (See Perches)
Work (See Benches—Stands, Work)
Birch Bros., Inc. ..... A
Fisher Mfg. Co. ..... A
Saco-Lowell Shops ..... B

TACHOMETERS
Centrifugal (See Tachometers—Mechanical)
Chronometric (See Tachometers—Mechanical)
Electric ..... **A**
Hand (See Tachometers—Mechanical)
Mechanical ..... **B**
Alemite Div. Stewart-Warner Corp. ..... A, B
Cocker Machine and Foundry Co. ..... A

TACKING MACHINES
Birch Bros., Inc.

TALLOW
Emkay Chemical Co.

TANKS
Copper & Brass ..... **A**
Corrosion-Resisting (See also Tanks—Copper & Brass) ..... **B**
Glass-Lined ..... **C**
Iron & Steel ..... **D**
Wood ..... **E**
Allen Son's Co., Wm., Div. O. G. Kelley & Co. ..... B, D, E
Batson Co., Louis P. ..... E
Birch Bros., Inc. ..... A, C, D
Carroll & Co., J. E. ..... B
Cocker Machine and Foundry Co. ..... D
Fisher Mfg. Co. ..... B, D
Hunt Machine Co., Rodney ..... B
Klauder Weldon Giles Machine Co. ..... B
McKiernan-Terry Corp., Textile Machinery Div. ..... B, D
Riggs & Lombard Co. ..... B
Textile Shops ..... A, B, D

TAPE—*Spinning and Twisting*
Booth Co., Benjamin
Davis & Furber Machine Co.
Hay Co., Inc., James E.
Southern Weaving Co.
Wearsaver—See Mt. Hope Machinery Co

TAPE CONDENSERS
Booth Co., Benjamin
Davis & Furber Machine Co.

TAPES—*Condenser*
Hay Co., Inc., James

TAR & PAINT REMOVERS
du Pont de Nemours & Co., Inc., E. I., Electrochemicals Dept.
Emkay Chemical Co.
Standard Soap Div., Concord Chemical Co.

TARPAULINS
Batson Co., Louis P.

TARTARIC ACID (See Acids)

TEASELING MACHINES (See Gigs)

TEMPLES—*Loom*
Batson Co., Louis P.

TENSIONS
Knitting-Machine ..... **A**
Open Width or Rope ..... **B**
Warper and/or Warper Creel ..... **C**
Winding-Machine ..... **D**
American Lava. Corp., Titania Div. ..... C, D
Batson Co., Louis P. ..... B, C
Birch Bros., Inc. ..... B, D
Cocker Machine & Foundry Co. C
Foster Machine Co. ..... C, D
Mt. Hope Machinery Co. ..... B
Reiner, Inc., Robert ..... A, C, D
Universal Winding Co. ..... D

TENTER FRAMES—*Cloth*
Butterworth & Sons Co., H. W.
Dalton Sheet Metal, Inc.
Marshall & Williams Corp.
Gessner Co., David

TENTER PLATES
Butterworth & Sons Co., H. W.
Marshall & Williams Corp.

TENTER TRACKS
Birch Bros., Inc.
Butterworth & Sons Co., H. W.
Marshall & Williams Corp.

TESTERS—*Abrasion*
Custom Scientific Instrument, Inc.

TESTERS—*Ball Bursting*
Scott Testers, Inc.

TESTER—*Cohesion*
Custom Scientific Instrument, Inc.

TESTERS—*Color Matching* (See Color-Matching Equipment)

TESTERS—*Compressibility*
Custom Scientific Instrument, Inc.

TESTERS—*Cotton Lap*
Saco-Lowell Shops
Thomason Textile Service, Inc.

TESTERS—*Diaphragm Bursting*
Mullen—See Perkins & Son Inc.
B. F. Perkins & Son Inc.

TESTERS—*Fiber Strength*
Scott Testers, Inc.

TESTERS—*Flammability*
Custom Scientfic Instrument, Inc.

TESTERS—*Nepping*
Custom Scientific Instrument, Inc.
Wright Machinery Co.

TESTERS—*Pilling*
Custom Scientific Instrument, Inc.

TESTERS—*Roving*
Custom Scientific Instrument, Inc.
Scott Testers, Inc.
Universal Winding Co.

TESTERS—*Sliver*
Custom Scientific Instrument, Inc.
Saco-Lowell Shops
Universal Winding Co.

THICKENERS (See Gums or Printing Thickeners)

TESTERS—*Tearing*
Scott Testers, Inc.

TESTERS—*Tensile Strength & Elongation*
Scott Testers, Inc.

TESTERS—*Tension*
Custom Scientific Instrument, Inc.
Universal Winding Co.

TESTERS—*Thermal Conductivity*
Custom Scientific Instrument, Inc.

TESTERS—*Thickness*
Custom Scientific Instrument, Inc.

TESTERS—*Twist*
Scott Testers, Inc.

TESTERS—*Wrinkle*
Custom Scientific Instrument, Inc.

TESTERS—*Yarn Evenness*
Scott Testers, Inc.
Universal Winding Co.

TESTING LABORATORIES—(See Laboratories—Testing)

THERMOMETERS—*Indicating Industrial*
Wiegand Co., Edwin L.

THERMOMETERS—*Recording* (See Instruments—Temperature, Indicating & Recording)

TETRAFLUOROETHYLENE YARNS (See Yarns & Fibers)

THERMOSTATS—*Industrial and/or Room*
Wiegand Co., Edwin L.

THINNERS & THINNING AGENTS
Batson Co., Louis P.
Emkay Chemical Co.

THREAD COMPRESSORS
American Lava Corp., Titania Div.

THROWING MACHINES (See also Twisters—Yarn, or Up-Twisters)
Universal Winding Co.

THROWING OILS (See Lubricants—Fiber & Yarn)

THROWSTERS (See Commission Services)

TIGERS
Gessner Co., David
Riggs & Lombard Co.

TIN—*Salts of Chloride*
General Chemicals Div., Allied Chemical Corp.

TIES—*Bale* (See Strapping—Box & Carton)

FOR ADVERTISING PAGE NUMBERS AND ADDRESSES SEE PG. 223

TIN CRYSTALS (See Tin—Salts of Chloride)

TIN SALTS (See Tin—Salts of Chloride)

TINTING MACHINES
Batson Co., Louis P.

TINTS—*Fugitive*
General Dyestuff Co., Sales Div., General Aniline & Film Corp.
Harshaw Chemical Co.

TIPPING MACHINES
B. F. Perkins & Son Inc.

TOMMY DODDS (See Mangles—Cloth)

TOOLS—*Strapping* (See Strapping—Box & Carton)

TOTE BOXES (See Boxes—Tote)

TRANSFER IRONS
Textile Machine Works

TRANSFER MACHINES
Textile Machine Works

TRANSMISSIONS—*Variable Speed* (Gear—See Motors—Gear)
Dodge Mfg. Corp.

TRANSPORTATION—*Machinery* (See also Trucking Services)
Turner Transfer

TRAPS—*Steam or Compressed Air*
Perfecting Service Co.
Unitrap—See Perfecting Service Co.

TRAVELERS—*Ring*
American—See National Ring Traveler Co.
Dary Ring Traveler Co.
Hicks—See National Ring Traveler Co.
National Ring Traveler Co.
Wentworth—See National Ring Traveler Co.
Wilson—See National Ring Traveler Co.

TRICOT MACHINES (See Knitting Machines—Tricot)

TRIMMERS—*Selvage* (See Cutters—Selvage Loop)

TRISODIUM PHOSPHATE (See Sodium—Salts of—Phosphates, Tri-basic)

TROUGHS (See Cylinders)

TRUCKING SERVICES (See also Carloading Service)
Turner Transfer

TRUCKS
Elevating & Stacking ..... **A**
Fiber (See Trucks—Mill)
Fork Lift (See Trucks—Elevating & Stacking)
Hand-Lift ..... **B**
Lap (See Trucks—Mill)
Lift Trucks (See Trucks—Elevating & Stacking, or Hand Lift)
Loom Beam (See Trucks—Mill)
Mill ..... **C**
Mop (See Floor Cleaning, Sanding, Scrubbing & Polishing Machines)
Pallet (See Trucks—Hand Lift)
Pin-Board ..... **D**
Batson Co., Louis P. ..... A, B, C, D
Excel Co., Inc. ..... B, C, D
Fisher Mfg. Co. C
Kennett Equipment & Machinery Co.
National Vulcanized Fibre Co., Kennett Div. ..... C, D
Riggs & Lombard Co. C

TRUCKS—*Beam, Bobbin, Cake Drying, Conditioning, Doffing, Dryer, Dyehouse, etc.*, (See Trucks—Mill)

TRUCKS—*Canvas* (See Baskets—Canvas, or Trucks—Mill)

TRUCKS—*Crane* (See Trucks—Elevating & Stacking)

TRUCKS—*Quill-Board, Reel, Roving, Sliver Can* (See Trucks—Mill)

TRUCKS—*Tiering* (See Trucks—Elevating & Stacking)

TRUCKS—*Warp, Yarn* (See Trucks—Mill)

TUBES
Cloth (See Cores)
Fibre & Plastic ..... **A**
Metal (Yarn) ..... **B**
Paper ..... **C**
Perforated ..... **D**
Redraw, Caps & Chucks ..... **E**
Wood ..... **F**
American Paper Tube Co. ..... A, C
Adolff, Emil, Reutlingen/Wttg., Germany Rep. by Textube Corp. Watson & Desmond Crowther Ltd. ..... F
Batson Co., Louis P. ..... A, D, E, F
Dytex—See Sonoco Products Co.
Engineered Plastics, Inc. ..... A, B, E
National Vulcanized Fibre Co. ..... A, B, E, F
North Waterford Spool Co. ..... F
Plastic Mold & Engineering Co. ..... A
Sonoco Products Co. ..... A, C, D

TUBING (See Pipes or Steel Tubing)

TUBS—*Dye* (See Tanks—Corrosion-Resisting, or Wood)

TUBS—*Soaking* (See Tanks)

TURBO COMPRESSORS (See Air Compressors)

TURKEY RED OIL (See Oil—Fiber Process)

TURNINGS—*Wood*
Batson Co., Louis P.

TWISTERS
Ring (See Twisters—Yarn)
Yarn (See also Throwing Machines or Up-Twisters) ..... **A**
Leesona—See Universal Winding Co.
Saco-Lowell Shops ..... A
Societe Alsacienne de Constructions Mechaniques, Mulhouse, France—Rep. in U.S.A. by Atkinson Haserick & Co. ..... A
Universal Winding Co. ..... A

TWIST SETTERS
Industrial Dryer Corp.
Riggs & Lombard Co.

UNIONS—*Rotary* (See Joints—Revolving)

UNWINDERS—*Cloth*
Mt. Hope Machinery Co.

UPTWISTERS
Universal Winding Co.

USED MACHINERY & EQUIPMENT (See Pages 198-206)

V-BELTS (See Belts—V)

VACUUM CLEANING MACHINES (See Cleaners—Portable Industrial Floor Vacuum)

VACUUM NOIL-HANDLING MACHINES (See Collectors—Broken End & Noil, Vacuum)

VALVES
Corrosion-Resisting Gate, Angle Globe & Check ..... **A**
Diaphragm-Operated ..... **B**
Hydraulic ..... **C**
Pressure-Regulating ..... **D**
Safety, Pressure-Relief ..... **E**
Solenoid ..... **F**
Engineered Plastics, Inc. ..... A
Johnson Corp. ..... B, F
Logemann Bros. Co. ..... C, D, E

VALVE SPROCKET RIM
Babbitt Steam Specialty Co.

VAT COLORS (See Dyes)

VAT DYES (See Dyes)

VATS—*Dye* (See Tanks—Corrosion Resisting)

VEGETABLE DYES (See Dyes)

VEGETABLE GUMS (See Gums)

VENTILATION EQUIPMENT (See Air Conditioners—Central Type, or Fans—Exhaust & Ventilation)

VINYL STABILIZERS
Emkay Chemical Co.

VITRIOL (See Acids—Sulfuric)

WARP COMPRESSORS
Cocker Machine & Foundry Co.
Davis & Furber Machine Co.

WARP KNITTING MACHINES (See Knitting Machines—Milanese, Raschel, Tricot)

WARP-SIZING MACHINES (See Slashers)

WARP-WRAPPING MACHINES
Cocker Machine & Foundry Co.

WARPERS
Ball and/or Sliver ..... **A**
Beam ..... **B**
Spool ..... **C**
Cocker Machine & Foundry Co. ..... A, B, C
Davis & Furber Machine Co. ..... B
Parks Co., M. H. C
Reiner, Inc., Robert ..... B
Societe Alsacienne de Constructions Mechaniques, Mulhouse, France—Rep. in U.S.A. by Atkinson, Haserick & Co. ..... B

WASHERS—*Non-Metallic*
Engineered Plastics, Inc.

WASHING MACHINES
Endless-Blanket ..... **A**
Felt-Goods ..... **B**
Knit-Goods ..... **C**
Lace ..... **D**
Wool (See Scouring Machines)
Woven Fabric ..... **E**
Birch Bros., Inc. ..... E
Butterworth & Sons Co., H. W. ..... E
Hunt Machine Co., Rodney ..... A, B, C, D, E
McKiernan-Terry Corp., Textile Machinery Div. ..... C, E
Proctor & Schwartz, Inc. C
Riggs & Lombard Co. ..... A, B, C, D, E
Tensitrol—See Hunt Co., Rodney
Textile Shops ..... E

WATERPROOFING AGENTS—*Fabric*
Emkay Chemical Co.
Polymer Industries
Textile Adjuncts Corp.

WATER REPELLENTS
Moretex Chemical Products, Inc.
Emkay Chemical Co.
Polymer Industries
Textile Adjuncts Corp.

WATER TREATMENT
Slime & Waste Control Equipment ..... **A**
Slime & Waste Recovery, Chemical ..... **B**
Water Softening Equipment (See also Purifiers—Water) ..... **C**
Water Softening Agents (See also Chelating Agents and Sequestering Agents) ..... **D**
Emkay Chemical Co.
General Chemical Div., Allied Chemical Corp. ..... A & C

WAXES—*Synthetic*
Emkay Chemical Co.
Moretex Chemical Products, Inc.
United Elastic Corp.
Siddall Co., Inc., Geo. F.

WEBBING—*Non-elastic*
Southern Weaving Co.

WEB-FORMING MACHINES (See also Non-Woven Fabric Machines)
Curlator Corp.
Rando-Web—See Curlator Corp.
Proctor & Schwartz, Inc.

WEFT-STRAIGHTENING MACHINES (See Filling-Straightening Machines)

WEIGHTS
Creel-tension ..... **A**
Spinning Roll ..... **B**
Reiner, Inc. ..... A
Saco-Lowell Shops ..... B

WETTING AGENTS
Emkay Chemical Co.
Moretex Chemical Products, Inc.
Rohm & Haas Co., Inc.
Siddall Co., Inc., Geo. F.
Standard Soap Div., Concord Chemical Co.
Textile Adjuncts Corp.

WHEELS—*Truck* (See Casters & Wheels—Truck)

WHIZZERS (See Extractors—Centrifugal)

WILLOWS (See Dusting Machines—Wool & Waste)

WINCHES—*Electric*
Stephens-Adamson Mfg. Co.

FOR ADVERTISING PAGE NUMBERS AND ADDRESSES SEE PG. 223

WINDERS
- **Ball** ... A
- **Braider Bobbin** ... B
- **Cloth** ... C
- **Cone** ... D
- **Cop (See Winders—Filling)**
- **Cut-Off** ... E
- **Fillet** ... F
- **Filling Bobbin** ... G
- **Knit Goods (See Winders—Cloth)**
- **Lap (See Lappers—Sliver)**
- **Multiple-End** ... H
- **Narrow-Fabric (See Winders—Cloth)**
- **Narrow-Fabric Filling—Bobbin** ... I
- **Quill (See Filling—Bobbin)**
- **Roll (See Winders—Cloth)**
- **Skein (See also Reels—Skeining)** ... J
- **Thread (See Spoolers—Thread)**
- **Tube** ... K

Abbott Machine Co. ... A, B, D, G, K
Birch Bros., Inc. ... C
Butterworth & Sons Co., H. W. ... C
Foster Machine Co. ... D, G, H, K
Leesona—See Universal Winding Co.
B. F. Perkins & Son Inc.
Reiner, Inc, Robert ... B, G, I
Riggs & Lombard Co. ... C
Sargent's Sons Corp., C. G. ... A
Societe Alsacienne de Constructions Mechaniques, Mulhouse, France—Rep. by Atkinson, Haserick & Co. D, H
Textile Shops ... C
Universal Winding Co. ... D, G, H, I, J, K

WIRES—*Pile*
Batson Co., Louis P.

WIRE-STITCHING MACHINES
Acme Steel Co.

WOOL BLENDER (See Blenders—Fiber)

WOOL OILS (See Oil—Fiber Process)

WOOL-SCOURING MACHINES (See Scouring Machines)

WOOL SIZING (See Sizing Agents)

WOOL SPINNING FRAMES (See Spinning Frames—Wool)

WORSTED SPINNING FRAMES (See Spinning Frames—Worsted)

WRINGERS (See Mangles)

YARN CLEARERS (See Clearers—Flat & Revolving, or Slub Catchers)

YARN CONDITIONERS (See Conditioners—Yarn)

YARN DYEING MACHINES (See Dyeing Machines—Package or Skein)

YARN MEASURING MACHINES (See Counters—Yarn Yardage, or Hanking Machines or Reels—Skeining)

YARN SIZING MACHINES
Foster Machine Co.
Societe Alsacienne de Constructions Mechaniques, Mulhouse, France—Rep. in U.S.A. by Atkinson, Haserick & Co.
Universal Winding Co.

YARN-TREATING MACHINES (See Impregnating Machines)

YARNS & FIBERS
- **Acrylic** ... A
- **Cellulose Esters (Acetate)** ... B
- **Polyamide** ... C
- **Polyester** ... D
- **Regenerated Cellulose (Rayon)** ... E
- **Tetrafluoroethylene** ... F
- **Textured** ... G

American Enka Corp. ... C, E, G
Du Pont de Nemours & Co., E.I. ... A, B, C, D, E, F, G

ZINC
- **Formaldehyde Sulfoxylate (Basic)** ... A
- **Hydrosulfite** ... B
- **Nitrate** ... C
- **Oxide** ... D

Harshaw Chemical Co. ... C
Rohm & Haas Co., Inc. ... A, B
Tennessee Corp. ... D

INDEX TO ADVERTISERS

This index is published as a convenience to the reader. Every care is taken to make it accurate, but Textile World assumes no responsibility for errors or omissions.

A

Abbott Machine Co., Inc., Wilton, N. H. ... 84

Acme Steel Co., 135th St. & Perry Ave., Chicago 27, Ill. ... Third Cover

Adams, Inc., 209 East Stone Ave., Greenville, S. C. ... 95

Adolff, Emil Reutinglen/Wttg., Germany ... 77

Alemite Div., Stewart-Warner Corp., 1850 Diversey Parkway, Chicago 14, Ill. ... 181

Allegheny Steel Band Co., P.O. Box 716, Pittsburgh 30, Pa. ... 84

Allen Son's Co., William, Div., O. G. Kelley & Co., P. O. Box 175, Shrewsbury, Mass. ... 158

Allied Chemical Corp., General Chemical Div., 40 Rector St., New York 6, N. Y. ... 143

American Enka Corp., 530 Fifth Ave., New York 1, N. Y. ... 20

American Lava Corp., Titania, Div., Manufacturers Rd., Chattanooga 5, Tenn. ... 191

American Paper Tube Co., Rhode Island Hospital Trust Bldg., Woonsocket, R. I. ... 80

Andrews & Goodrich Div., Div. of Midland-Ross Corp. 444 Madison Ave. New York, N. Y. ... 162

Atkinson, Haserick & Co., Framingham, Mass. ... 83

B

Babbitt Steam Specialty Co., 15 Babbitt Sq., New Bedford, Mass. ... 185

Bahnson Co., 1001 S. Marshall St., Winston-Salem, N. C. ... 72

Bassick Co., 3045 Fairfield Ave., Bridgeport 5, Conn. ... 182

Batson Co., Louis P., P. O. 772, Greenville, S. C. ... 69

Birch Bros., Inc., 32 Kent St., Somerville 43, Mass. ... 106

Booth Co., Benjamin, Allegheny Ave. & Janey St., Philadelphia 34, Pa. ... 91

Butterworth & Sons Co., H. W., Bethayres, Pa. ... 132, 133

C

Carolina Knitting Machine Co., 508-14 West 5th St., Charlotte 1, N. C. ... 71

Carbic Hoechst Corp., 451 Washington St., New York, N. Y. ... 129

Carroll & Co., J. E., 100 Cambridge St., Lowell, Mass. ... 140

Clinton Corn Processing Co., Clinton, Iowa ... 68

Cocker Machine & Foundry Co., Box 431, Gastonia, N. C. ... 60, 61

Continental Diamond Fibre Corp., Newark 44, Del. ... 62, 63

Crowther Limited, 212-214 Victoria Ave., Westmount, Montreal P. Q. ... 77

Curlator Corp., 501 W. Commercial St., E. Rochester, N. Y. ... 75

Custom Scientific Instrument, Inc., 541 Devon St., Kearny, N. J. ... 80

Cyclone Fence Dept., American Steel & Wire Div., U. S. Steel Corp., Waukegan, Ill. ... 197

D

Dalton Sheet Metal, Inc. 439 S. McCamy St. Dalton, Ga. ... 146

Dary Ring Traveler Co., Taunton, Mass. ... 89

Davis & Furber Machine Co., North Andover, Mass. ... 94

Dixon Corp., Bristol, R. I. ... 85

Dodge Mfg. Co., 3500 Union St., Mishawaka, Ind. ... 193

Dommerich & Co., L. F., 485 Fifth Ave., New York 17, N. Y. ... 13

duPont de Nemours & Co., Inc., E. I. Electrochemicals Dept., Wilmington 98, Del ... 138, 139

duPont de Nemours & Co., Inc., E. I., Textile Fibers Div., Wilmington 98, Del. ... 58, 59

E

Emkay Chemical Co., 319 Second St., Elizabeth, N. J. ... 158

Engineered Plastics, Inc., Gibsonville, N. C. ... 82

Firestone Synthetic Rubber & Latex Co., Akron 1, Ohio ... 151

Excel Co., Inc., Lee Ave., Lincolnton, N. C. ... 186

F

Faultless Caster Co., 1521 N. Garvin St., Evansville 7, Ind. ... 184

Ferguson Gear Co., Gastonia, N. C. ... 196

Finnell System, Inc., 1900 East St., Elkhart, Ind. ... 190

Fisher Mfg. Co., Hartwell, Ga. ... 84

Foster Machine Co., Westfield, Mass. ... 64, 65

G

Gastonia Roller, Flyer & Spindle Co., 1212 East Industrial Ave., Gastonia, N. C. ... 194

General Dyestuff Co., Sales Div., General Aniline & Film Corp., 435 Hudson St., New York 14, N. Y. ... 135

Georgia-Carolina Oil Co., P. O. Box 101, Macon, Ga. ... 184

Gessner Co., David, 41 Fremont Ave., Worcester 3, Mass. ... 104

G. P. E. Controls Inc., 274 East Ontario St., Chicago 11, Ill. ... 142

Gubelin International Co. Mt. Kisco, N. Y. ... 81

Guider Specialty Co., 427 West Rock Ave., New Haven 15, Conn. ... 140

H

Harshaw Chemical Co., 1945 East 97th St., Cleveland 6, Ohio ... 152

Hartford-Greenville Div., Standard Screw Co., Box 1776, Greenville, S. C. ... 78

Harwood & Son, Geo. S., 50 Lagrange St., Worcester 8, Mass. ... 102

Hay Co., Inc., James E., 244 Smith St., Lowell, Mass. ... 102

Hunt Machine Co., Rodney, 72 Mill St., Orange, Mass. ... 153

Continued on next page

I

Industrial Coatings, Inc., Box 1567, Greenville, S. C..... 15

Industrial Dryer Corp., 432 Fairfield Ave., Box 850, Stamford, Conn. 75

Industrial Sapphire Co., Box 422, Quakertown, Pa. 92

Ives Co., Loyal T., 19 Water St., New Brunswick, N. J. 100

J

Jarrell-Bullard Co., Box 2154, Charlotte, N. C..... 196

Jenkins Sons, M. W., 131 Pompton Ave., Cedar Grove, N. J. 90

Jiffy Textile Marker Co., 206 West School Lane, Philadelphia 44, Pa..... 158

Johnson Corp., 814 Wood St., Three Rivers, Mich..... 195

K

Kennett Equipment & Machinery Co., Kennett Square, Pennsylvania..... 90

Klauder Weldon Giles Machine Co., Adams Ave. and Leiper St., Frankford, Philadelphia 24, Pa..... 127

Klutts Machine & Foundry Co., Gastonia, N. C..... 93

Kluttz Rings Inc., Gastonia, N. C. 93

L

Lanly Co., The, 2800 Euclid Ave., Cleveland 15, Ohio.. 134

Lincoln Engineering Co., Div. McNeil Machine & Engr. Co., 5742 Natural Bridge Ave., St. Louis 20, Mo.... 185

Livingston & Haven, Inc., Box 808-W, Charleston, S. C. 88

Lockwood Greene Engineers, Inc., 41 E. 42nd St., New York 20, N. Y. 17

Logemann Bros. Co., 3100 W. Burleigh St., Milwaukee, Wis. 4

Loper Co., Ralph E., Wade Hampton Blvd., Greenville, S. C. 15

M

Main, Inc., Charles T., 80 Federal St., Boston 10, Mass. 16

Marshall & Williams Corp., 46 Baker St., Providence 5, R. I. 144, 145

McKiernan-Terry Corp., Textile Machinery Div., Dover, N. J. 148, 149

Mirro-Aluminum Co., Manitowoc, Wis. 189

Mixing Equipment Co., 179-g Mt. Read Blvd., Rochester 11, N. Y. 161

Monsanto Chemical Co., Plastics Div., Springfield 2, Mass. 154, 155

Moretex Chemical Products, Inc., Box 2528 Spartanburg, S. C. 146

Morris Fur Co., Box 816, Burlington, N. C. 194

Mt. Hope Machinery Co., 55 Fifth St., Taunton, Mass... 159

N

National Drying Machine Co., Inc., N. E. Corn. Hancock St. & Lehigh Ave., Phila. 33, Pa. 128

National Ring Traveler Co., 354 Pine St., Pawtucket, R. I. 74

National Vulcanized Fibre Co., Wilmington 98, Del... 70

National Vulcanized Fibre Co., Lestershire Div., Wilmington 98, Del. 86

New Departure Div., General Motors Corp., Bristol, Conn. 164

Nissen Co., John P., Jr., Box 888, Glenside, Pa. 160

North Waterford Spool Co., Box "F", North Waterford, Me. 84

O

Ordnance Gauge Co., Amber & Hagert Streets, Philadelphia 25, Pa. 102

P

Pabst Brewing Co., Merchandise Mart, Chicago 54, Ill. 158

Parks Co., M. H., 30 Brown St., Winchendon, Mass.... 90

Perfecting Service Co., 332 Atando Ave., Charlotte, N. C. 192

B. F. Perkins & Son Inc. Box 388, Holyoke, Mass... 130

Plastic Mold & Engineering Co., 157 Clifford St., Providence 3, R. I. 88, 89

Polymer Industries, Springdale, Conn. 142

Portland Co., Box 427, Portland 6, Me..... 92

Proctor & Schwartz, Inc., 7th & Tabor Rd., Philadelphia 20, Pa..... 73

R

Ragan Ring Co., 901 S. Main St., East Point, Ga..... 82

Reiner Inc., Robert, 550-564 Gregory Ave., Weehawken, N. J. 101

Riggs & Lombard Co., Box 191, Lowell, Mass.....156, 157

Robert & Co., Associates, 69 Poplar St., N. W., Atlanta, Ga. .....Second Cover

Rohm & Haas Co., Inc., 222 West Washington Square, Philadelphia 5, Pa..... 141

Rotherm Engineering Co., Inc., 7280 W. Devon Ave., Chicago 31, Ill..... 196

Roy & Son Co., B. S., 775 Southbridge St., Worcester, Mass. and Gastonia, N. C..... 96

S

Saco-Lowell Shops, 60 Batterymarch St., Boston 10, Mass. 66, 67

Sargent's Sons Corp., C. G., Graniteville, Mass. 87

Schlumberger & Cie, N., Guebwiller, Alsace, France 97

Scott Testers, Inc., 100 Blackstone St., Providence 5, R. I..... 89

Siddall Co., Inc., Geo. F., Box 925, Spartanburg, S. C. 160

Sims Metal Works, West Point, Ga..... 136

Sirrine Co., Greenville, S. C.. 16

SKF Industries, Inc., Box 6731, Philadelphia 32, Pa... 187

Snowiss Fur Co., B., Lockhaven, Pa. 186

Societe Alsacienne de Constructions Mechaniques, Mulhouse, France 83

Sonoco Products Co., Hartsville, S. C..... 18

South Florida Test Service, 4201 N.W., 7th St., Miami 44, Fla. 17

Southern Bobbin Works, Inc., Box 3514, Greenville, S. C.. 16

Southern Weaving Co., Box 2090, Greenville, S. C.. 196

Speizman Co., Morris, 508-514 West Fifth St., Charlotte 1, N. C..... 71

Spindles, Motors & Machines, Ltd., Switzerland 81

Staley Mfg. Co., A. E., Box 151, Decatur, Ill..... 2

Standard Soap Div., Concord Chemical Co., Inc., Camden 1, N. J..... 160

Statikil, Inc., 1220 W. 6th St., Cleveland 13, Ohio.... 86

Stephens-Adamson Mfg. Co., 48 Ridgeway Ave., Aurora, Ill. 183

Supreme Knitting Machine Co., Inc., 94-02 104th St., Ozone Park 16, N. Y..... 103

Swift & Co., Adhesive Products Dept., 4115 Packers Ave., Chicago 9, Ill. 147

T

Taylor Co., Halsey W., 137 North Ave., N. W., Warren, Ohio 14

Tennessee Corp., 619 Grant Bldg., Atlanta 1, Ga..... 134

Textile Adjuncts Corp., 876 Pacific St., Brooklyn 38, N. Y. 152

Textile Machine Works, Reading, Pa. 98, 99

Textile Shield Co., Inc., 1 Grotton St., Lawrence, Mass. 78

Textile Shops, Spartanburg, S. C. 79

Textube Corp., 695 Summer St., Stamford, Conn..... 77

Thilmany Pulp & Paper Co., Kaukauna, Wis. 131

Thomason Textile Service, Inc., 2233 Greene St., Charlotte 8, N. C..... 82

Tompkins Bros. Co., 623 Oneida St., Syracuse 4, N. Y. 102

Turbo Machine Co., Lansdale, Pa. 150

Turner Transfer, P.O. Box 3426, 3201 High Point Rd., Greensboro, N. C..... 13

U

United Elastic Corp., Easthampton, Mass. 14

Universal Winding Co., Box 1605, Providence 1, R. I.. 57

Utica Novelty & Mill Specialty Co., 2145 Dwyer Ave., Utica 2, N. Y..... 88

V

Veeder-Root, Inc., 70 Sargent St., Hartford 2, Conn. .....Fourth Cover

Verona Dyestuffs, A Division of Verona-Pharma Chemical Corp., Springfield Road, Union, N. J. 137

W

Watson & Desmond, 220 West Fourth St., Charlotte, N. C. 77

Werner Textile Consultants, 1889 Palmer Ave., Larchmont, N. Y..... 17

Western Felt Works, 4021-4139 Ogden Ave., Dept. F, Chicago 23, Ill..... 188

Whiting Products, 1000 Mill St., Camden, S. C..... 194

Wiegand Co., Edwin L., 7701 Thomas Blvd., Pittsburgh 8, Pa. 136

Woonsocket Napping Machinery Co., 355 Orchard St., Woonsocket, R. I..... 152

Wright Machinery Co., Div. of Sperry Rand Corp., Durham, N. C..... 86

SEARCHLIGHT SECTION

(Classified Advertising)

ADVERTISERS' INDEX 198

Know your AIM*... Renfrew Bleachery Division does...

Strapping Machine compresses, straps textiles

RENFREW BLEACHERY DIVISION OF ABNEY MILLS, Travelers Rest, South Carolina, with the help of their Acme Idea Man, found a better way to compress and strap boxes of cotton cloth. Now an Acme Steel Model F3 Strapping Machine serves as the heart of a highly efficient packaging system. One man straps the entire production in far less time than formerly required. (Idea No. S6-7)

Acme Idea Man J. B. Farr contributed to this modern packaging system.

The F3 successively compresses the pack and tensions, cuts and seals one strap —or two or three straps simultaneously—while the pack is still under compression. Air powered and electrically controlled with push-buttons, it applies each strap with uniform pre-determined tension. After each application, the platen rises and the strapped pack moves down the conveyor. While the following pack moves into the machine, straps are feeding into position for the next application. Packs of varying sizes can be compressed and strapped in any sequence without machine adjustment.

***Know your Acme Idea Man.** Listed in the Yellow Pages under "Steel Strapping", he is well equipped to cooperate in solving your packaging and production problems. Call him today. Or write, Dept. TAS-79, Acme Steel Products Division, Acme Steel Company, Chicago 27, Illinois. In Canada, Acme Steel Company of Canada, Ltd., 743 Warden Ave., Toronto 13, Ontario.

ACME STEEL **STEEL STRAPPING**

It pays to get

VEEDER -ROOT COST-COUNTROL

all through your mill

From preparation to final inspection, Veeder-Root Counters help modern mills to *Countrol* production and costs . . . . with accurate, up-to-the-minute figures on every process.

At the right are the most widely used profit-protectors in the Veeder-Root Textile Line. Let your Veeder-Root representative show you how little it will cost to equip your mill *completely* with these new counters. *Call him in today.*

Remember . . . *Men Who Count* are the men who count the profits.

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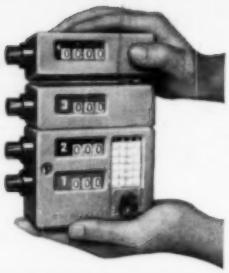
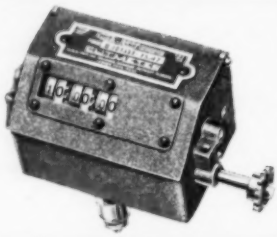


2-3-4 Pick, Hank, Yardage & Knitting Machine Counters:

These convertible counters record production separately for each of 2, 3 or 4 shifts, providing a basis for wage payment. Basic 2-shift counter can have 3rd and 4th shift counting units added right in the factory, on the machine, as needed.



Loom Cut Meters
AND PREDETERMINING COUNTERS:

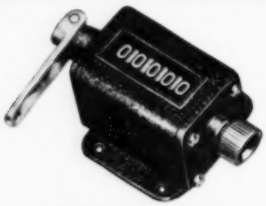
Cut Meters are predetermining counters for looms, for controlling lengths of cloth woven, without cut marks . . . and without over-runs and shortages. Also available are High Speed Predetermining Counters, both geared and ratchet types, to count any preset number of turns, strokes, pieces, lengths, etc.

Double-Wheel Measuring Counters:

Worm-driven Reset Counter at left registers linear units as friction wheels pass over the material. Medium speed range. Widely used in inspection.

High Speed Reset Double Wheel Counter runs at speeds up to 6,000 rpm or 8,000 cpm.

Resets to zero with finger-flick.



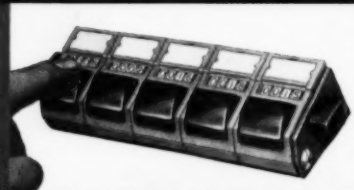
Small Reset Counters:

Used on a wide variety of textile machines. Revolution or ratchet types, for speeds up to 1,000 counts per minute.

Reset Magnetic Counters:

Base mounted or panel mounted. Ruggedly built for speeds up to 1,000 counts per minute. Knob or lock-key reset.

Widely used for remote indication.



Vary-Tally:

This modern hand-operated counter, made only by Veeder-Root, is arranged compactly on stands in tiers. Can be supplied in any of 67 combinations up to 6 tiers high and 12 units wide. Entire row of counters is reset to zero with a turn of one knob.

Hosiery Dozens Counter:

Used in inspection, doffing or on knitting machines. Small figures show single-stocking count. Large figures indicate dozens of pairs up to 100. Hand, foot, or machine actuated.